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ABSTRACT

As one in a series of test item collections developed by the Assessment and Evaluation Unit of the Directorate of Studies, items are made available to teachers for the construction of unit tests or term examinations or as a basis for class discussion. Each collection was reviewed for content validity and reliability. The test items meet syllabus content and aims best suited to multiple choice questions, but teachers are meant to base the use of the test items on student ability and the particular program objectives in grades 7 through 10. The second of two volumes of test items in physics contain sections on electrostatics, electrodynamics and electronics. Items concerning magnetism, mass and density, pressure and motion are included. Sections on radioactivity and astronomy complete the volume. There are 356 test items. Answers are provided with each item and drawings and diagrams illustrate many questions. (CM)

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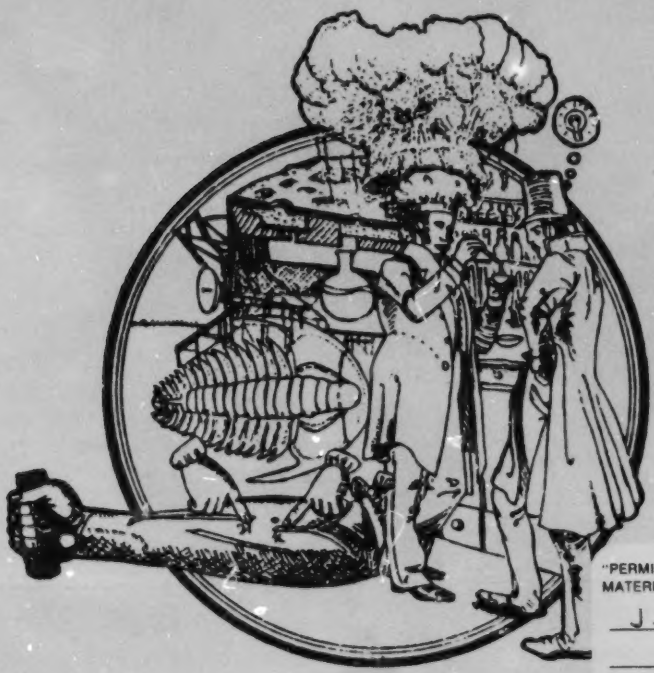

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A COLLECTION OF MULTIPLE CHOICE TEST ITEMS RELATING MAINLY TO

PHYSICS - 2

TM 820 320

VOLUME TWENTY-ONE OF THE SCIENCE LIBRARY OF TEST ITEMS

ISBN - 0 - 7240 - 5853 - 2

VOLUME TWENTY-ONE OF THE
SCIENCE LIBRARY OF TEST ITEMS

PHYSICS - 2

Also in this series.....

Volume 17	BIOLOGY
Volume 18	CHEMISTRY
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Produced by the
School Certificate Development Unit
Directorate of Studies
Department of Education
New South Wales
1981

Acknowledgements

Many teachers have been involved in developing the library of test items. As with any list of credits, there will always be some who are inadvertently overlooked. To these we extend our apologies.

Those who appear in our files, in alphabetical order, appear in the list below. To these, our thanks and appreciation for work done and the hope that we will continue to receive your support in the future:

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Lorraine STEVENS	Murray High School
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And a special thanks to the girls at S.C.D.U. who have typed without (audible) complaint as we have constantly changed question after question.

JAN ANGLIM
ALISON ADLARD
SHARON WEBB
WENDY HOME

Editorial and Review Committee

Mary BLACKBURN
Kim BILLINGHAM
Brian JARMAN
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DEVELOPMENT OF THE LIBRARY

This collection of material is intended as a resource to assist teachers to implement and evaluate courses in the first four years of secondary school.

Because the questions were submitted by classroom teachers from both Government and non-Government schools in all parts of the State, they constitute a cross-section of the ideas which currently pervade classroom practice.

To ensure quality in the collection, only those items which satisfied several quality control checks have been included. Foremost among these were:

(i) inspection by a panel of experienced, practising teachers;

(ii) a pretest with a representative selection of Years 7-10 students.

As well as sharing in the general editing and reviewing functions, the review panels checked each item for *content validity*. The pretest was used to establish the *efficiency* of the items as measuring instruments. Three of the major statistical criteria used were:

(i) Item Facility: The facility index measures the proportion of the sample candidature who answered the question correctly. All items in this collection have a facility index between 0.30 and 0.90.

(ii) Item Discrimination: This index measures the degree to which success on the item is correlated with success on the total test of which the item is a part. A commonly used index of discrimination is the point-biserial correlation coefficient. Every item in this collection attained a point-biserial correlation coefficient of at least 0.20. This means that on the pretest, each item added significantly to the total score of information about the relative achievement of the candidature.

(iii) Distractor Efficiency: With each item, each distractor was chosen by at least 5% of the total candidature, except in the case of very easy items, where an even spread of respondents was sought.

For the test to be *reliable*, many features apart from these three must be considered. However, the proven quality of these items, as measured by these three criteria, makes it highly likely that any test chosen from this collection, and administered to *appropriate* classes, will be a more reliable instrument than teachers could normally produce without this assistance.

USING THE COLLECTION

Items in this collection may be reproduced for classroom use in any form desired by the teacher. To facilitate the preparation of printing masters particular attention has been given to both the diagrams and the layout of the items.

To assist the teacher, the items have been classified according to the content being tested and two pieces of information are provided:

(i) the key (or correct option), and;

(ii) the difficulty rating (1-5), which is based on the data obtained during the pre-testing program. A question rated "1" was correctly answered by some 30-40% of students, while "5" indicates a correct response by 80-90% of students in the pre-test sample. Recent investigations have shown that while this information is useful as a general guide, item difficulties vary greatly when items are given to classes who have recently studied the material covered in given items. The ratings should not be confused with norms or goals: they are merely useful guidelines for teachers.

It is suggested that items might be used for the following purposes

1. As a source of items for short unit tests.
2. As a source of items for term tests.
3. As a source of ideas for in-school item construction.
4. As a basis for class discussions (it should be noted that stimulus material was NOT designed for use with the overhead projector. The letter size used in typing items would not be legible at more than 4 metres from the screen in an average classroom).

One important warning should be given to all teachers using this collection. Some areas of syllabus content and some syllabus aims are better suited to testing with multiple choice items than others Consequently, this collection is unlikely to be balanced in its coverage. In addition, the inclusion of an item is not intended to imply that a particular piece of content or teaching strategy has a place in the curriculum. The final selection must lie with the teacher in the classroom who knows the interests and abilities of his students.

Comments, criticisms and suggestions from teachers are welcome. All correspondence should be addressed to :

The Subject Officer (Science),
Directorate of Studies,
Box 33 G.P.O.,
SYDNEY. 2001.

CONTENTS

The contents of the Physics item collection is contained in two volumes, volumes twenty and twenty one of the Science library of test items.

For convenience, the broad categories in each have been listed in both volumes.

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ELECTROSTATICS

A student was asked to determine the type of electric charge on an unknown rod. He suspended the rod and observed that it was

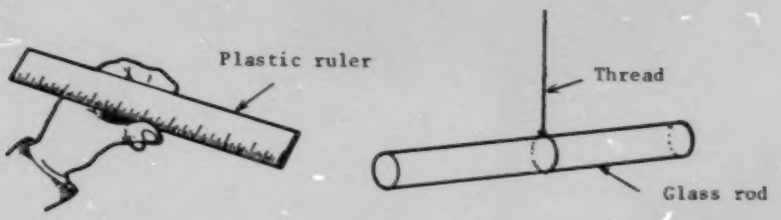
I. attracted by a perspex rod rubbed with silk.
II. repelled by an ebonite rod rubbed with flannel.

From these observations the student should conclude that the charge on the unknown rod is

A. positive.
B. negative.
C. opposite to that on the ebonite rod.
C1 D. similar to that on the perspex rod.

25

A student charged a plastic ruler with a negative charge. He then charged a glass rod with a positive charge, and hung it on a thread.



If the ruler is brought near one end of the glass rod, it will

A. attract the glass rod.
B. cause the glass rod to vibrate.
C. magnetize the glass rod.
A3 D. repel the glass rod.

26

A charged body will attract another body

A. of the same charge.
B. of opposite charge only.
C. if it is uncharged or the same charge.
C4 D. if it is the same charge or opposite charge.

26

An ebonite rod is rubbed with flannel. Which of the following statements, about the rod and the flannel, is correct?

A. the rod becomes positively charged and the flannel becomes negatively charged.
B. both become positively charged.
C. both become negatively charged.
D1 D. the rod becomes negatively charged and the flannel becomes positively charged.

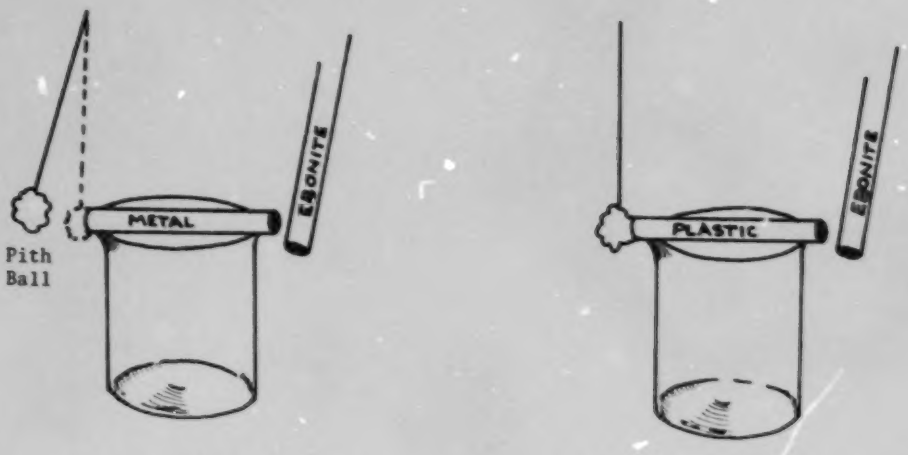
26

A charged plastic rod is suspended by a thread at its centre. Another charged rod is brought near one end of the first and causes it to move away. This means that the suspended rod must have

A. a positive electrical charge.
B. a negative electrical charge.
C. the same charge as the second rod.
C3 D. a different charge from the second rod.

26

The picture below shows the behaviour of a pith ball touching a rod of metal or plastic when a charged ebonite rod is brought near the other end.



Which of the following best explains the behaviour of the pith ball?

A. There must be some electrons in metals which are free to move.
B. Pith adheres better to plastic materials than to metals.
C. It is impossible to put an electric charge onto plastic.
D. Pith is unreliable in its behaviour and the experiment should be repeated.

A2

264

The next question refers to this information.

A plastic rod which had been rubbed with silk was moved close to two test rods with these results:

TEST ROD	TYPE	RESULT
1	perspex rod rubbed with silk	repelled
2	ebonite rod rubbed with silk	attracted

What is the best conclusion to be drawn from these results?

A. The test rods have the same electric charge.
B. The test rods have no electric charge.
C. The test rods have different electric charges.
D. The test rods were charged by the plastic rod.

C4

265

Which statement below is <u>NOT</u> related to static electricity?

A. A cat's fur crackles when it is stroked.
B. A comb rubbed through hair will attract pieces of paper.
C. A faulty electrical appliance causes an electric shock.
D. A petrol truck drags a chain along the road.

C3

266

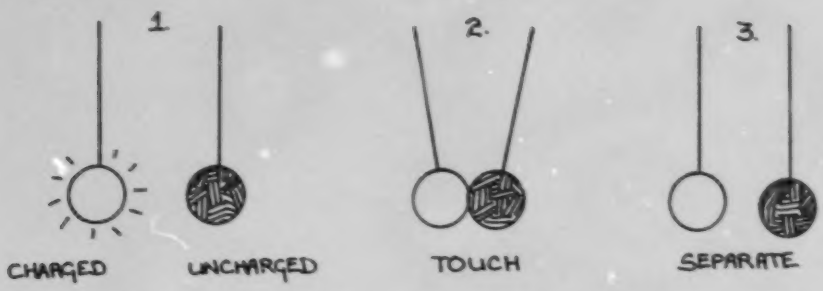
A thin stream of water is attracted to a perspex rod which has been charged by rubbing on wool or flannel. This property indicates that water is

A. filled with ionic salts.
B. made of polarised molecules.
C. of opposite charge to that of perspex.
D. composed of molecules in the same way as perspex.

B1

267

A charged, isolated pith ball was allowed to touch an isolated, uncharged pith ball. The balls were then separated, as shown.

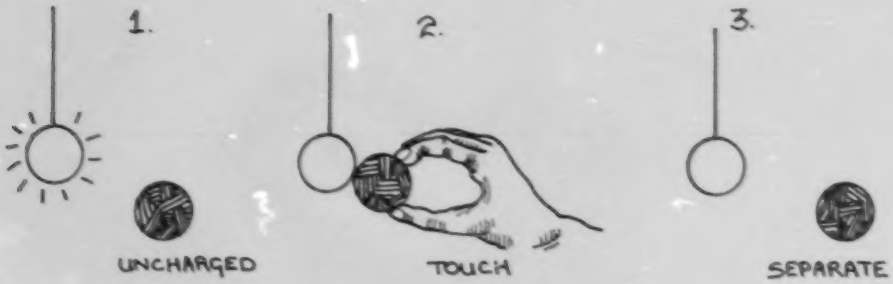


Which statement below is correct?
After separation

A. the black ball now carries all the charge.
B. both balls are uncharged.
C. each ball carries half the original charge.
D. the black ball will have slightly more charge than the white ball.

C3. 268

A charged pith ball was touched with an uncharged pith ball, and the two balls were separated again, as shown below.



Which statement below is correct?
After separation

A. each ball carries half the original charge.
B. both balls are uncharged.
C. the black ball will carry all the original charge.
D. the white ball still carries all its original charge.

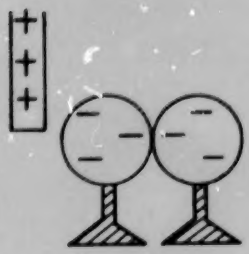
B2. 269

A body will obtain a positive charge if

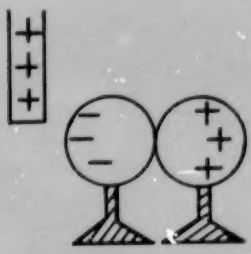
A. neutrons are added to it.
B. electrons are removed from it.
C. the nucleus is unchanged.
D. it becomes magnetic.

B2 270

Two insulated conductors of the same size and shape initially with no net charge are brought in contact with each other. A positively charged rod is then brought near one of the conductors. Which one of the following diagrams best represents the charge distribution on the surfaces of the conductors?



A



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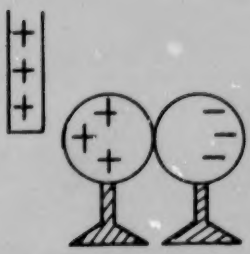
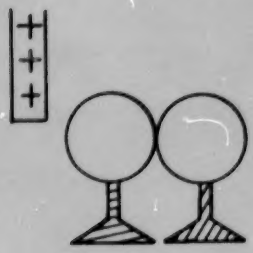


B



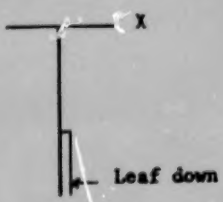
D

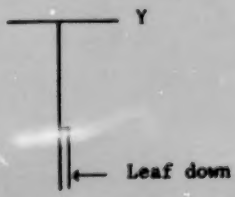
No overall charges or separation of charge

C.1

271

The diagrams represent 2 uncharged electroscopes.





If a negatively charged rod is brought near X and a positively charged rod is brought near Y the effect on the leaves is

	Electroscope X	Electroscope Y
A.	up	down
B.	down	down
C.	down	up
D.	up	up

D.1

272

The next question refers to this information.

DIAGRAM 1

shows an uncharged electroscope. Electroscopes are used to detect charges.

DIAGRAM 1

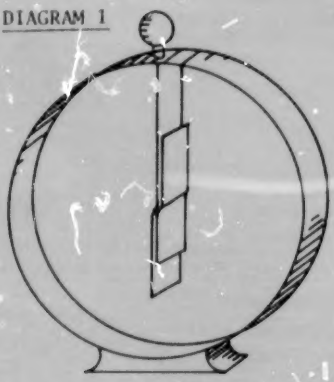


DIAGRAM 2

This electroscope is carrying an UNKNOWN charge.

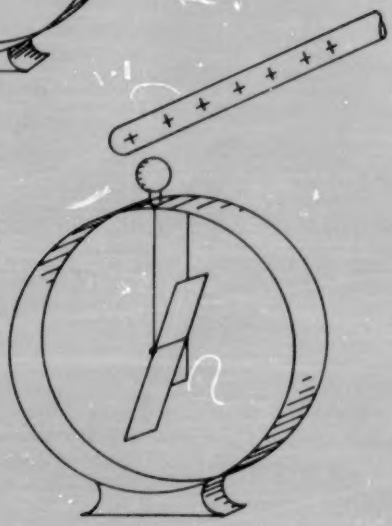


DIAGRAM 3

When a positively charged rod is brought near the conducting knob of the electroscope with the UNKNOWN charge the leaves of the electroscope collapse as shown.

From the information above, we may conclude that the unknown charge

A. is definitely positive.
B. is definitely negative.
C. might be either positive or negative.
D. cannot be determined until you touch the knob with the charged rod.

B1.

273

The body of a car may become electrically charged on a warm, dry day because

A. sparks from the spark plug charge the engine.
B. friction between passengers and their seats charge the car.
C. air flows over the car as it drives along the road.
C2 D. when its battery is overheated, charge leaks to the car body. 274

Which statement is correct?

A. Like charges attract each other.
B. An electrical force exists between charged particles.
C. A body with an excess of electrons is positively charged.
B2 D. A body with a deficiency of protons is positively charged. 275

A glass rod is rubbed with a cloth, and then tested for charge. It is found to have a negative charge. You could expect the cloth to have

A. a positive charge equal to that on the rod.
B. a positive charge smaller than that on the rod.
C. no charge at all.
A2 D. a negative charge smaller than that on the rod. 276

ELECTRODYNAMICS

The information below refers to the next two questions.

The mathematics of electrical circuits, in part, can be summarised, using I for current, V for potential difference, and R for resistance:

a) Series Circuit Theory

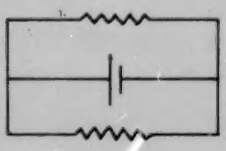
$$I = I_1 = I_2 = \ldots$$
$$V = V_1 + V_2 + \ldots$$
$$R = R_1 + R_2 + \ldots$$

b) Parallel Circuit Theory

$$I = I_1 + I_2 + \ldots$$
$$V = V_1 = V_2 = \ldots$$
$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots$$

Which of the circuits drawn below could be used to test the Series Circuit Theory?

A



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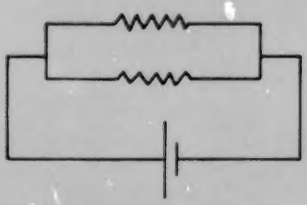

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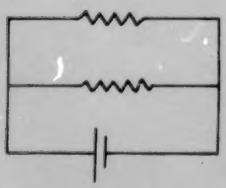
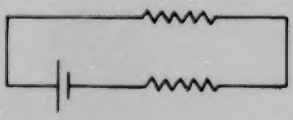


D

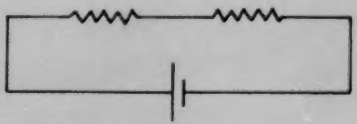


D1.

277

Which circuit would be most suitable to use in an experiment to determine that $I = I_1 + I_2$?

A



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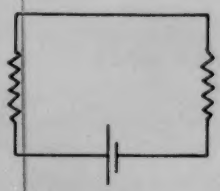

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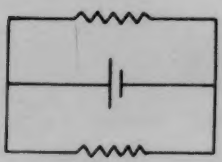

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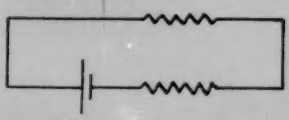
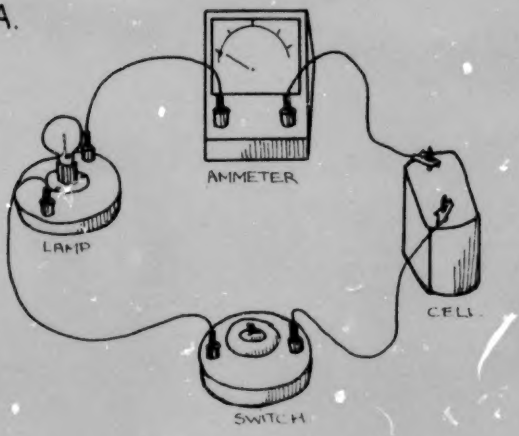


B2.

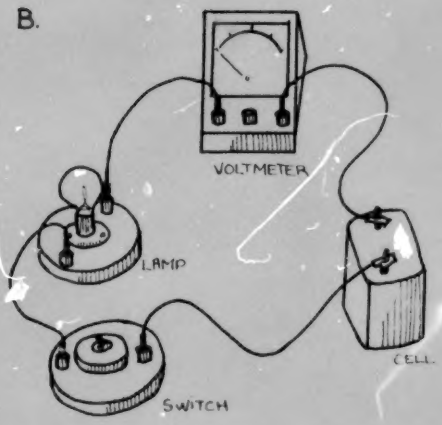
278

The next question refers to these electrical circuits.

A.



B.



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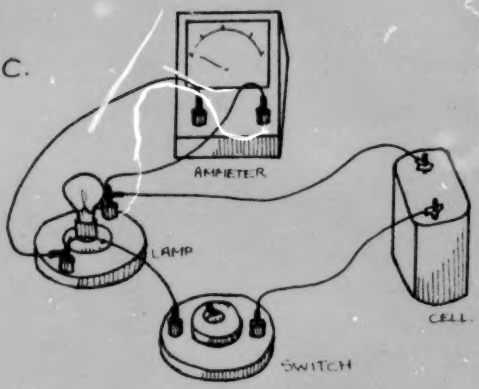
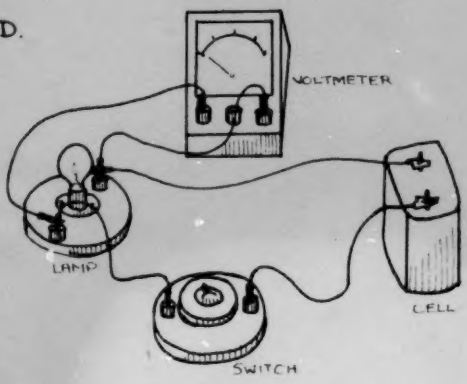


D.



Which of the above electrical circuits, A, B, C or D, is wired to correctly measure the current flowing through the lamp?

27

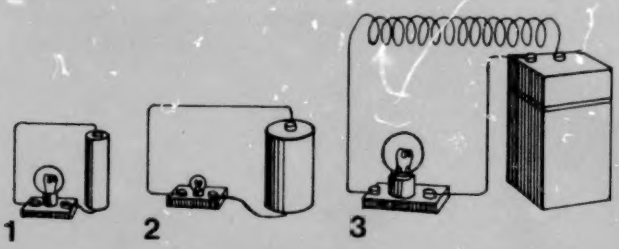
A.1

A student measured the electric current flowing in a coil of wire and also the voltage. He noticed that when the voltage was 3 volts the current was 2 amps and for 9 volts the current was 6 amps.
Realizing the current was affected by voltage he decided to make a prediction of the current size when the voltage was 12 volts and test his prediction by measuring the current with a meter.
His prediction of current size for a voltage of 12 volts would be 280

A. 3 amps. B. 5 amps. C. 8 amps. D. 15 amps.

C4.

The diagrams below show three steps that were taken to find out how the voltage of a battery affects the brightness of a globe.



Is this a good way of finding out?

A. Yes, because the lengths of wire were kept the same in each step.
B. Yes, because the electric current was kept the same in each step.
C. No, because several things were different in each step.
D. No, because coiled wire should have been used in each step.

C4. 281

If a magnet is moved inside a coil of wire an electric current is produced in the coil.

This fact provides the basic information for the construction of a

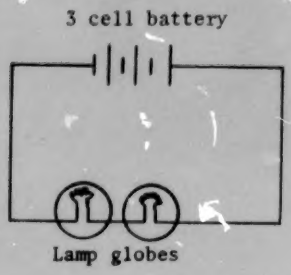
A. transformer. C. induction coil.
B. generator. D. electric motor.

B2.

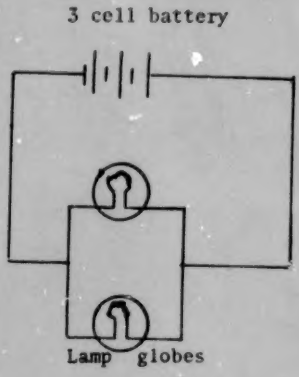
282

In which of the following circuits will the lamp be likely to glow most brightly? The components of each circuit are identical.

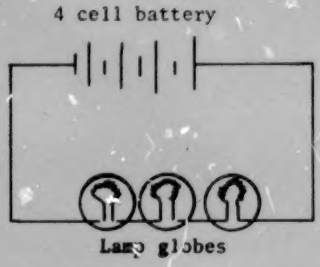
A.



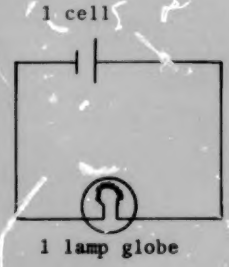
C.



B.



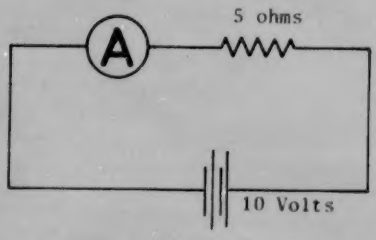
D.

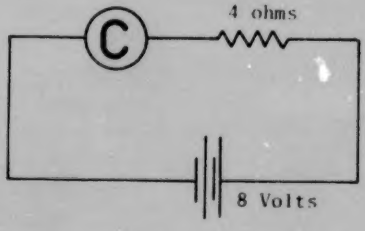


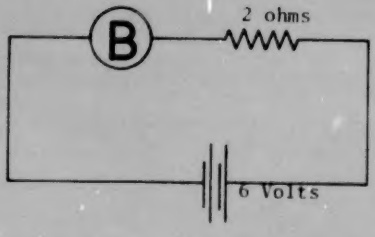
C1.

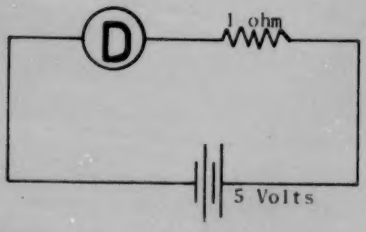
283

The next question refers to these four diagrams.







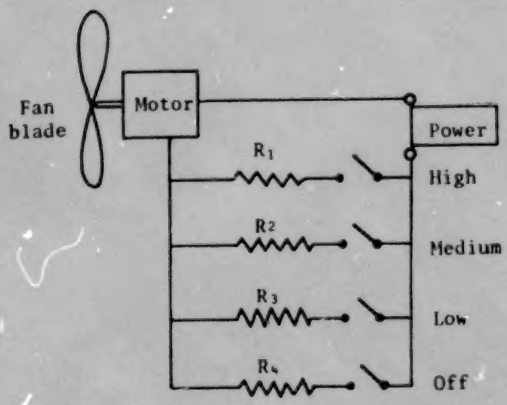


Which ammeter, A, B, C or D would indicate the largest flow of current?

D1.

284

The diagram refers to the question below.



The diagram shows a possible circuit for an electric fan with four (4) different speed switches.

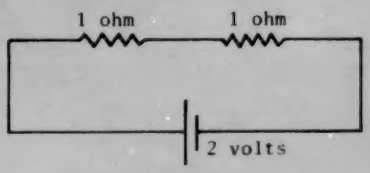
Which statement concerning this circuit is true?

A. Since more current is required for a high fan speed, R_1 must be the largest resistance.
B. When the fan is switched to the off position, current flows in R_4 only.
C. The current flowing through R_3 would be larger than the current in R_2.
D. The lower the resistance, the faster the fan blade will turn.

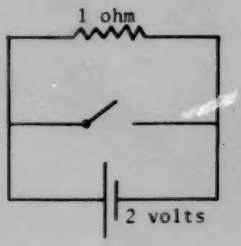
D3. 285

In which circuit below would 2 amp of electrical current be flowing?

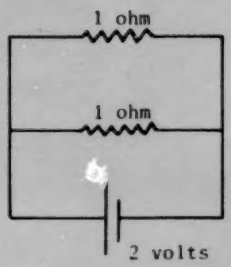
A



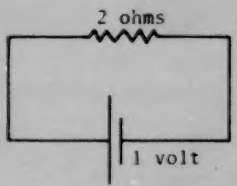
C



B



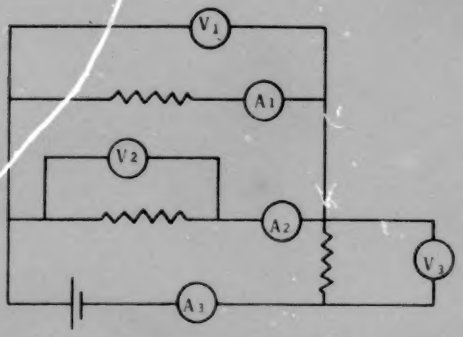
D



C1. 286

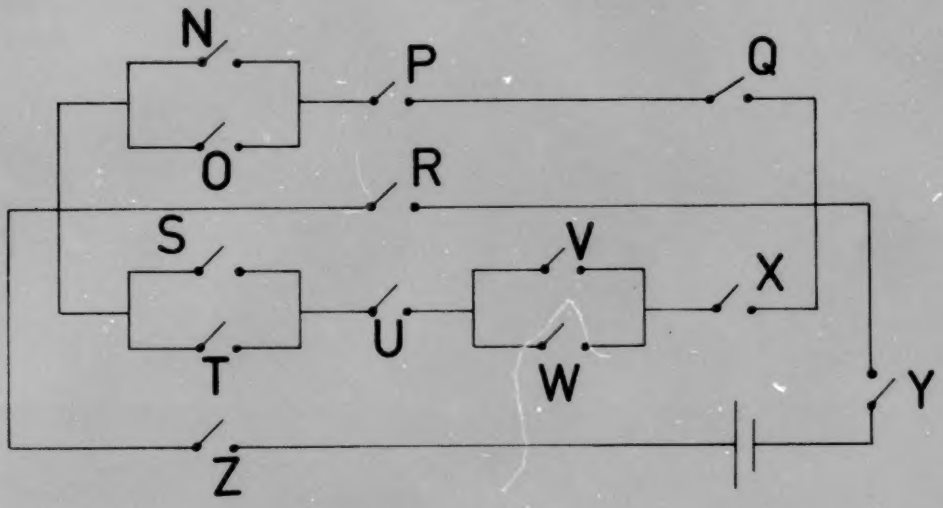
The next question refers to this circuit diagram.

A student wished to determine the current drawn from the battery. Which meter(s) must he need?



A. A_1 and A_2 and A_3.
B. V_1 and V_2 and V_3.
C. All 6 meters.
D. A_3 only.

L2. 287

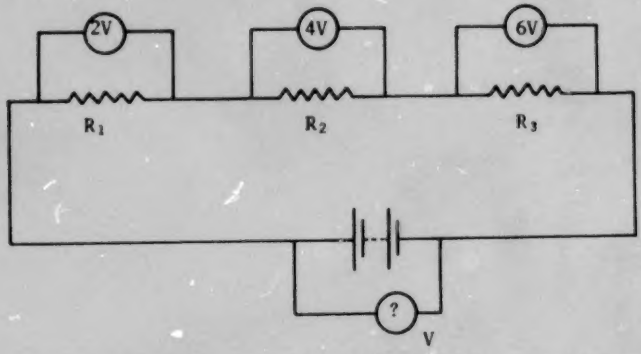


If a current is to flow in the circuit drawn above, which switches must be closed?

A. N, O, P, Q, Y.
B. Z, R, Y.
C. S, T, V, W, Y, Z.
D. R, S, T, U, V, W, X.

B2. 288

The diagram below refers to the next question.



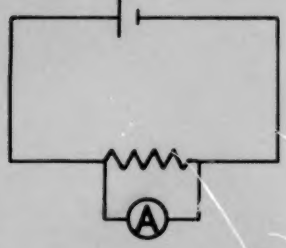
The diagram shows the readings on three voltmeters connected across three resistances.
What would be the scale reading on the voltmeter (V) connected across the battery?

A. 2 V. B. 8 V. C. 10 V. D. 12 V.

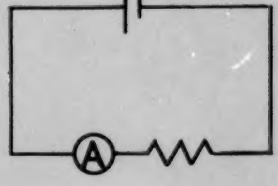
D3. 289

Of the circuits shown below the one which correctly measures the current flowing in the resistor is:

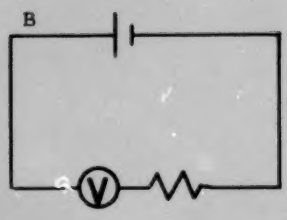
A



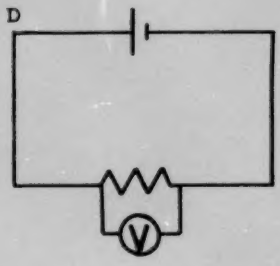
C



B

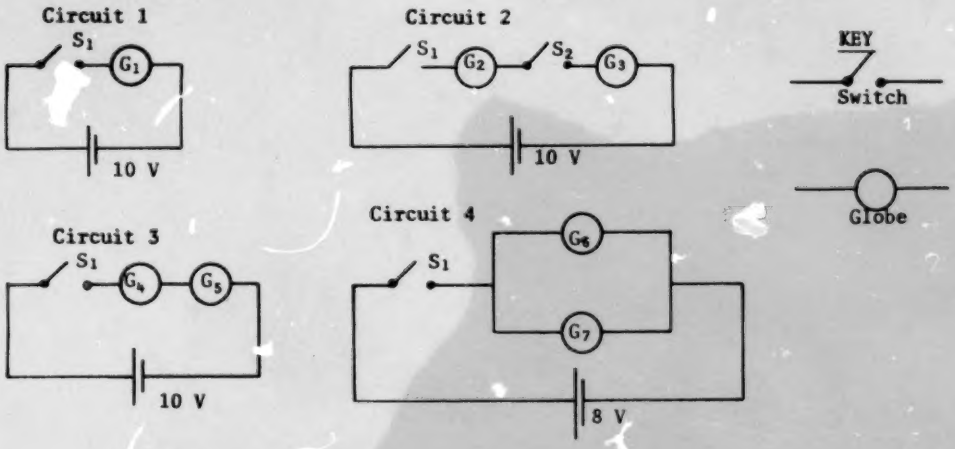


D



C1. 290

The next four questions refer to the following diagrams



If <u>in each</u> of the circuits above, switch 1 (S_1) were closed, what total number of globes would be alight?

A. 3 B. 4 C. 5 D. 6

C2. 291

If <u>all</u> switches were closed, which globe would glow brightest?

A. G_1 B. G_3 C. G_5 D. G_7

A4. 292

Which globes would glow with equal brightness? (Assume all switches are closed).

A. G_1 and G_6 and G_7.
B. G_2 and G_3 and G_4 and G_5.
C. G_2, G_3, G_4, G_5, G_6 and G_7.
D. G_4 and G_5 and G_6 and G_7.

B1.

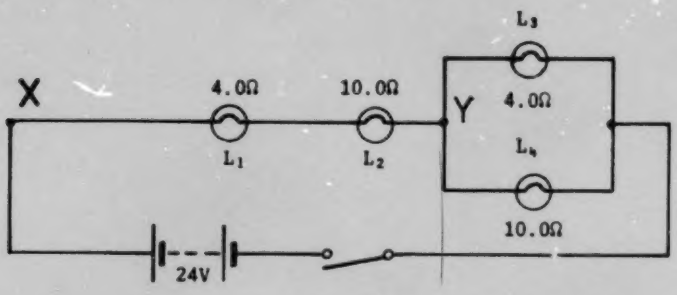
If <u>any three switches</u> were to be closed, what maximum number of globes could be on?

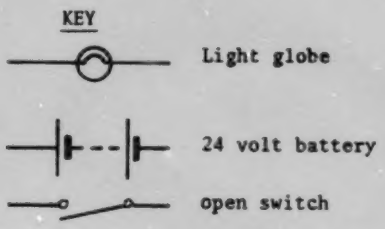
A. 3 B. 4 C. 5 D. 6

C3. 294

The next four questions refer to the following information.

An electrical circuit was set up which consisted of four light globes (L_1, L_2, L_3 and L_4) with the resistances shown, a switch and a 24 volt battery, as shown in the diagram below.





The potential difference across L_1 when the switch is closed will be

A. greater than 24 volts.
B. less than 24 volts.
C. equal to 24 volts.
D. varying continually.

B.1 295

The potential difference across L_3 is equal to

A. the potential difference across L_4.
B. the sum of the potential differences across L_1 and L_2.
C. the sum of the potential differences across L_1, L_2 and L_3.
D. 24 volts.

A.1 296

The next two questions refer to the information on the previous page.

Through which globe is the current least when the switch is closed?

A. L_1
B. L_2
C. L_3
D. L_4

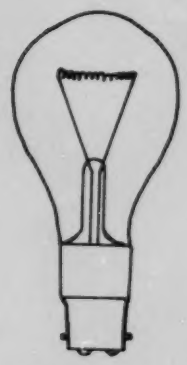
D.1 297

Of the following, the total resistance between X and Y is nearest to

A. 2.5 ohms.
B. 6.0 ohms.
C. 14 ohms.
D. 40 ohms.

C.3 298

Pictured below are two common household appliances.



Light bulb
240 volts
120 watts

Electric kettle
240 volts
480 watts

Given that the following relationship is correct -

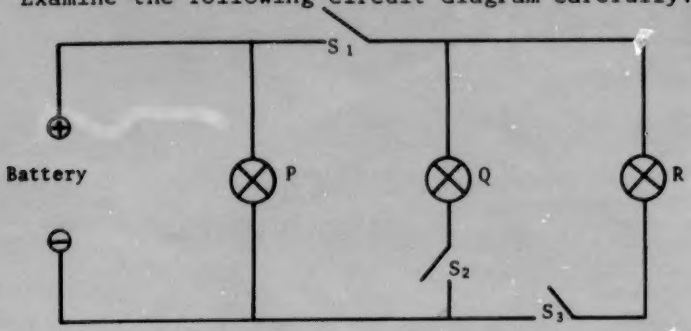
WATTS = AMPERES X VOLTS

the correct statement that can be deduced about the two appliances is that the light bulb

A. draws a higher current than the kettle.
B. has a higher resistance than the kettle.
C. has a higher power than the kettle.
D. uses more energy every second than the kettle does.

B.2 299

Examine the following circuit diagram carefully.



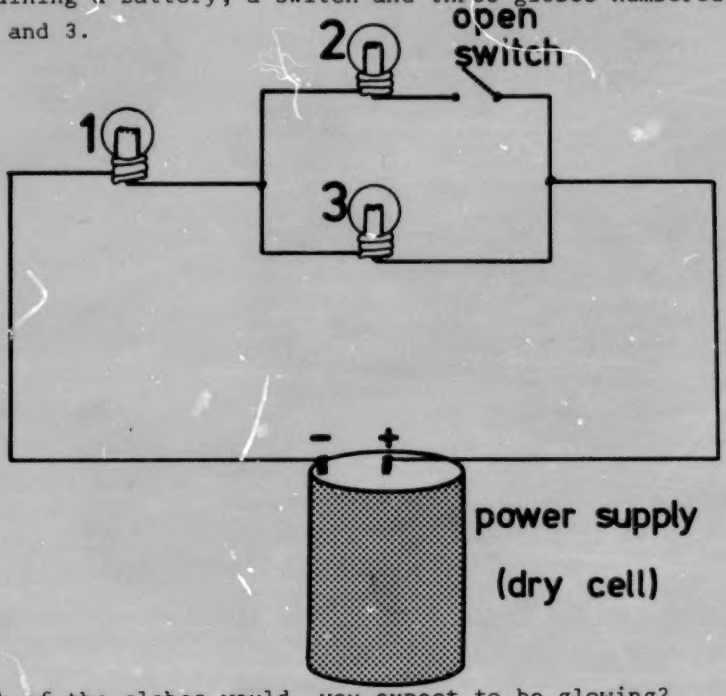
P, Q, R are electric lamps.
S_1, S_2, S_3, are switches.

In order to have only lamps P and R alight, it would be necessary to have the switches as follows:

A. S_1 open, S_2 open, S_3 closed.
B. S_1 closed, S_2 closed, S_3 closed.
C. S_1 closed, S_2 open, S_3 closed.
D. S_1 closed, S_2 closed, S_3 open.

C.3 300

The diagram below represents a simple electrical circuit containing a battery, a switch and three globes numbered 1, 2 and 3.



Which of the globes would you expect to be glowing?

A. Number 1 only.
B. Numbers 1 and 3.
C. Numbers 2 and 3.
D. None of them.

301

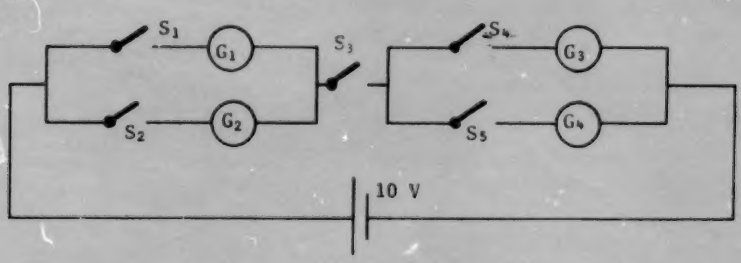
B.3

Manufacturers of incandescent light globes remove all oxygen from inside the globe, and in some cases refill it with nitrogen. The presence of oxygen would

A. prevent the metal element from glowing.
B. cause the metal element to burn.
C. allow the electric current to escape through the globe.
D. present too great a resistance for the electric current to flow.

B3. 302

The next three questions refer to this diagram.



The circuit above contains five switches (S_1 to S_5) and four identical globes (G_1 to G_4).

Which switches would need to be closed to switch on globes G_2 and G_3 only?

A. S_2 and S_3.
B. S_1, S_2, S_3 and S_4.
C. S_2, S_3 and S_4.
D. S_1, S_2, S_3, S_4 and S_5.

C3. 303

If switches S_1 and S_4 were closed, which globes would light up?

A. G_1 and G_4 only.
B. G_1 and G_3 only.
C. G_1, G_2 and G_3 only.
D. No globes would light up.

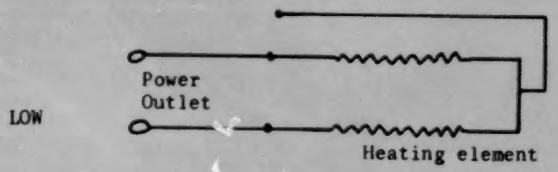
D3. 304

Which statement concerning the circuit is correct?

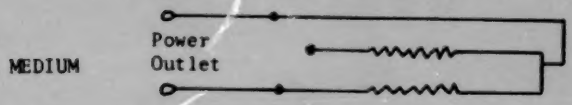
A. Globes G_1 and G_3 are connected in parallel with globes G_2 and G_4.
B. Globes G_1 and G_3 are connected in series. So are globes G_2 and G_4.
C. Globes G_1 and G_2 are connected in parallel with globes G_3 and G_4.
D. G_1 and G_2 are connected in parallel. So are G_3 and G_4.

D1. 305

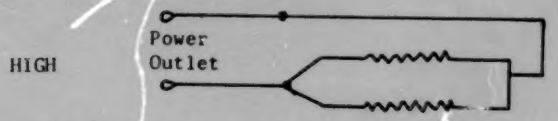
Many household heating appliances such as room heaters and electric blankets have three temperature settings - LOW, MEDIUM and HIGH. The three settings are obtained by using various combinations of two heating elements, as shown in the diagrams below.



Two heating elements connected in SERIES - small current flows through each.

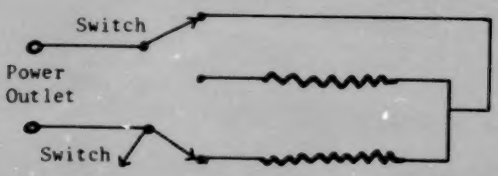


Only one heating element used in circuit - large current flows because of lower resistance.



Two heating elements connected in PARALLEL - large current flows through each.

The diagram below shows the heating circuit of such an appliance, complete with switches, in a simplified form.



The temperature setting on the appliance shown in the diagram is

A. LOW.
B. MEDIUM.
C. HIGH.
D. OFF.

B.3

306

A man who brought a 110 v T.V. set back from America was told to use a transformer between the set and the wall power point. The reason for using the transformer would be to

A. transform the voltage entering the set to match that being transmitted by the T.V. station.
B. reduce interference from the mains.
C. convert direct current to alternating current.
D. reduce the mains voltage to that required by the set.

307

D.3

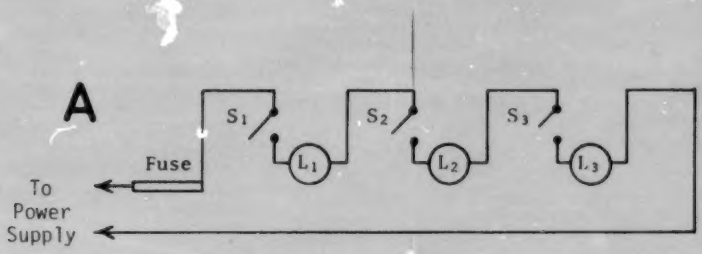
The purpose of the 'earth' wire in a power cord is to

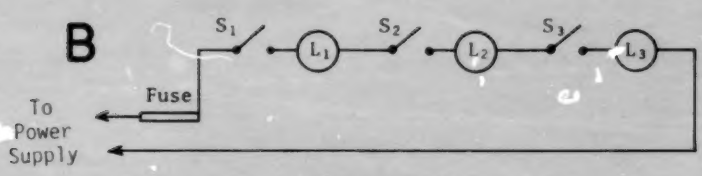
A. remove excess electricity from the circuit.
B. conduct electricity from the earth to the appliance being used.
C. conduct electricity away from the appliance in the case of a 'short'.
D. remove the risk of electrocution by not allowing any current to get to the appliance.

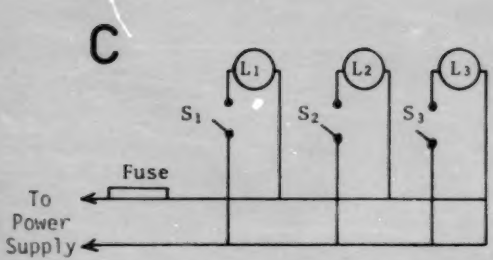
C1. 308

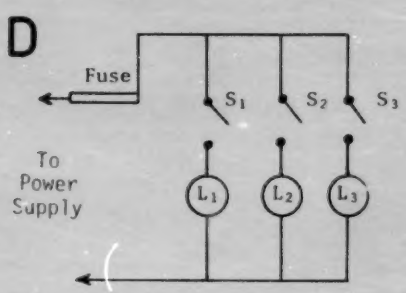
The diagrams show four different circuits for wiring three different lights (L_1, L_2, L_3) in three different rooms of a house, NOT all of each circuit is shown.

Which circuit would allow <u>any one</u> light to be switched on? (All other circuits would need <u>all</u> lights on before any would come on.)



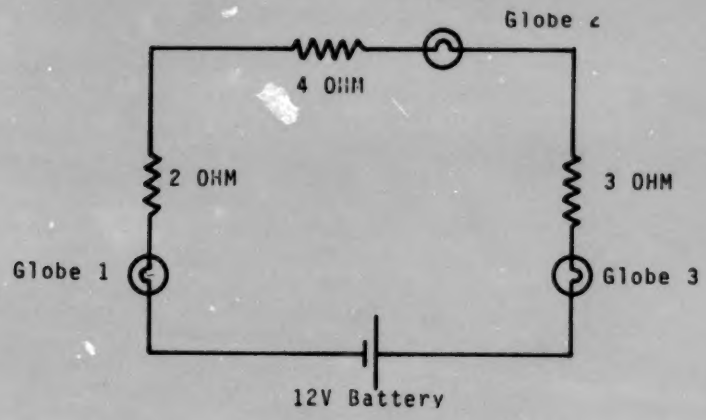






D1. 309

The next question refers to the diagram below.

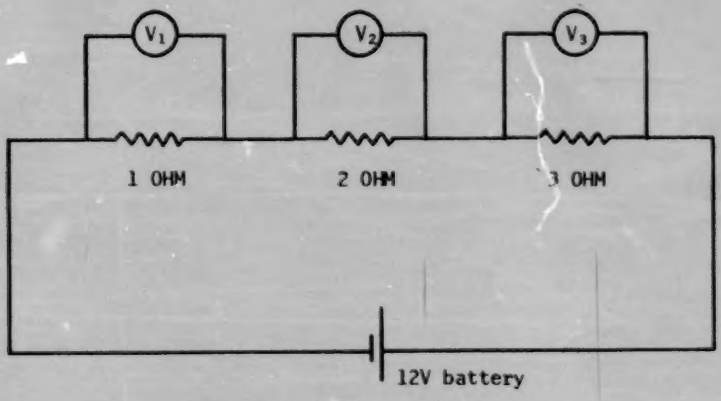


Which statement concerning the circuit above is true? (All globes are identical).

A. Globe 2 will glow twice as brightly as globe 1.
B. Globe 3 will glow brighter than globe 1, but less so than globe 2.
C. Globe 3 will be a little brighter than globe 2.
D3 D. All globes will glow equally brightly.

310

The next question refers to the circuit diagram below.



Which statement concerning the three voltmeters, V_1, V_2 and V_3 is correct?

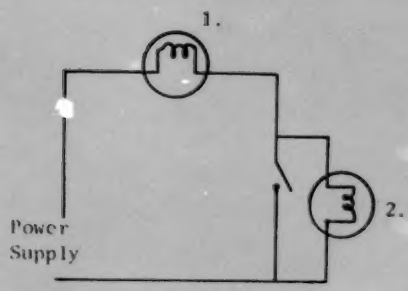
A. V_1 will read twice as much as V_2.
B. The reading on V_2 will be 4 amps.
C. All voltmeters will read 12 volts.
1 D. $V_1 + V_2 + V_3 = 12$

311

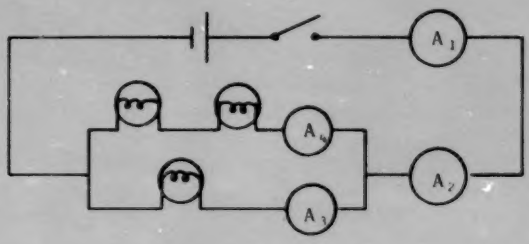
The next question refers to this electrical circuit.

If the switch in the circuit is closed, then

A. lamp 2 will become dimmer.
B. lamps 1 and 2 will both become dimmer.
C. lamp 2 will become brighter.
D. lamps 1 and 2 will both become brighter.



A2. 312

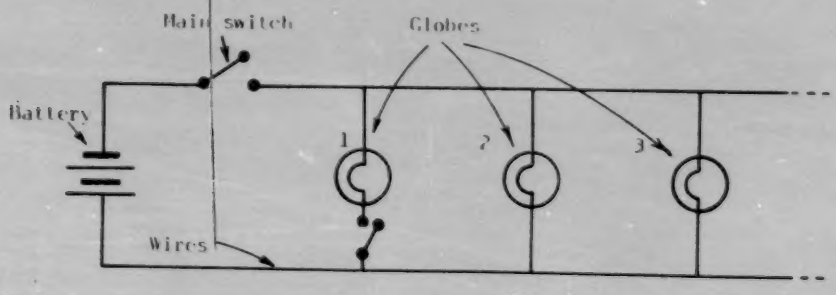


The three lamps in the above circuit are all exactly the same. When the switch is closed, the ammeter with the lowest reading will be

A. A_1 B. A_2 C. A_3 D. A_4

D1. 313

The diagram below shows an electrical circuit containing three globes 1, 2 and 3, a power supply and two switches.

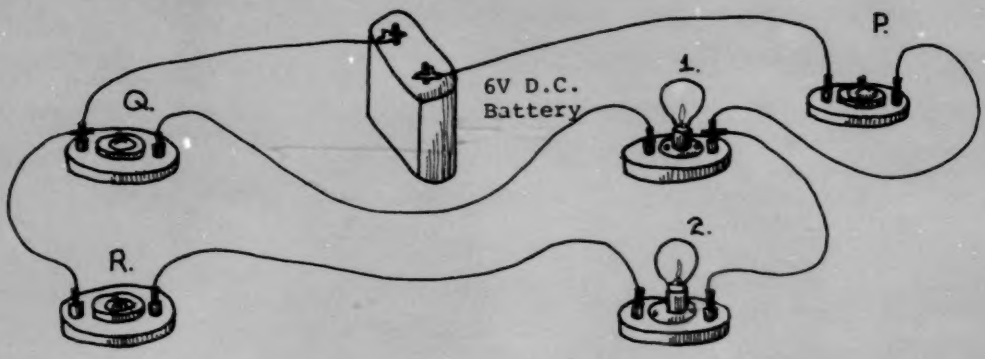


When the main switch is pressed, which of the globes will light up?

A. 1, 2 and 3.
B. 1 and 2 only.
C. 2 and 3 only.
D. None of them.

C3 31

The next two questions refer to this diagram.



The above circuit contains bulbs 1 and 2 and switches P, Q and R. If bulb 1 only is to light, the switches must be set so that

A. P is on and Q and R are off.
B. P and Q are on and R is off.
C. Q is on and P and R are off.

B3 D. Q and R are on and P is off.

315

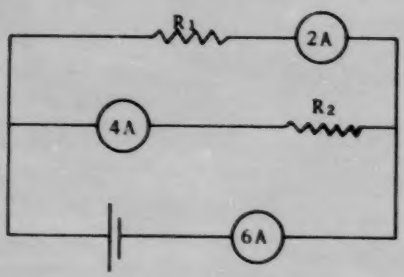
In the circuit, there are two bulbs 1 and 2, and three switches P, Q and R. If switches P and R are on and switch Q is off

A. bulb 1 only will glow.
B. bulb 2 only will glow.
C. both bulbs will glow.

B1 D. neither bulb will glow.

316

The next question refers to this diagram.

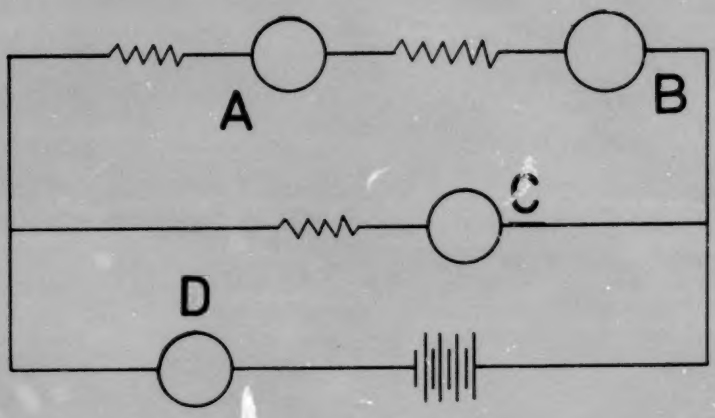


The diagram shows the readings on three ammeters in an electrical circuit which contains two resistances and a battery.

What is the total current drawn from the battery?

A1. A. 6 amps. B. 8 amps. C. 10 amps. D. 12 amps. 317

The next question refers to the diagram shown below.

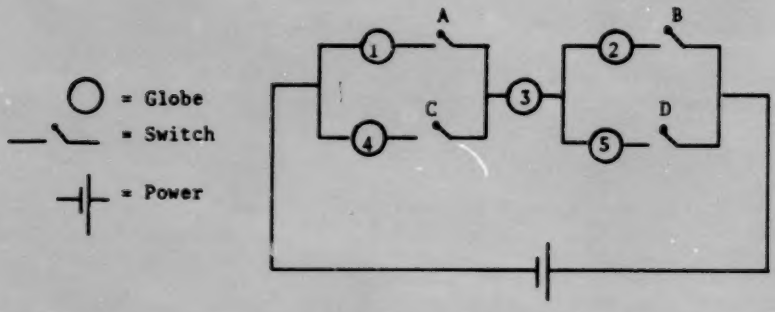


If the meters A, B, C and D above are all ammeters to measure electrical current, which meter would register the greatest current?

D3.

318

This question refers to this circuit diagram.



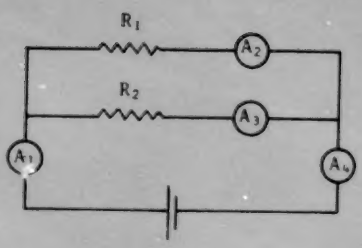
If switches A and D were closed in the above circuit, which globes would light up?

A. 1 and 5.
B. 1, 3 and 5.
C. 1, 2, 4 and 5.
D. 1, 2, 3, 4 and 5.

B3.

319

Look at the circuit diagram on the right. Which ammeter is best placed to measure the current flowing in R_2?



A. A_1 C. A_3

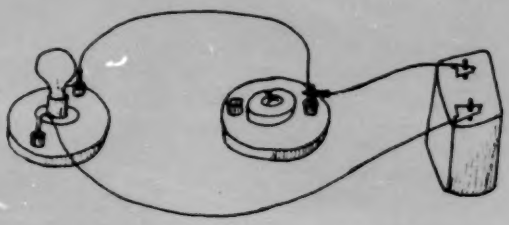
B. A_2 D. A_4

C4.

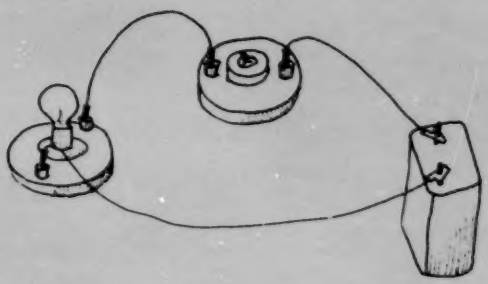
320

Which of the electrical circuits shown, A, B, C, D, is correctly wired to allow the lamp to light up?

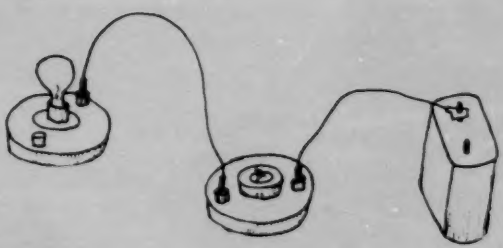
A.



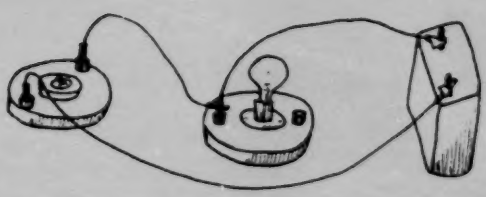
B.



C.



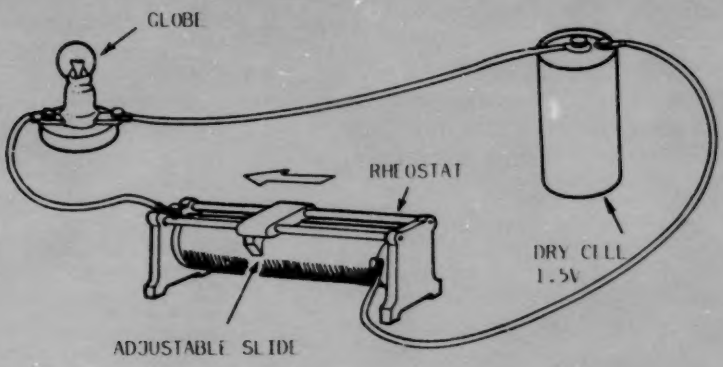
D.



B5.

321

The electrical resistance in the circuit below can be increased by moving the rheostat slide towards the left of the picture.



If the slide is moved gradually towards the left of the picture, which of the following will occur?

A. The brightness of the globe will not change.
B. The globe will immediately go out.
C. The globe will gradually lose its brightness.
C3 D. The globe will gradually increase its brightness.

32

A car owner fitted an ammeter to his car. He did this so he would know

A. how fast the car was travelling.
B. how many volts the battery was delivering to the electric circuits.
C. if the alternator was producing enough current to keep the car operating efficiently.
C1 D. how many revolutions the engine was doing per minute (RPM).

32

A 120 watt electric light globe gives out a brighter light than a 60 watt light globe mainly because

A. it has a larger volume of low pressure gas in it.
B. a larger potential difference is used to run it.
C. its resistance wire, or filament, is longer.
D3 D. more electric current flows through it.

32

To connect cells in series, you must

A. join the positive to the positive.
B. join the positive to the negative.
C. join the negative to the negative.
B4 D. use a wet cell then a dry cell and so on.

32

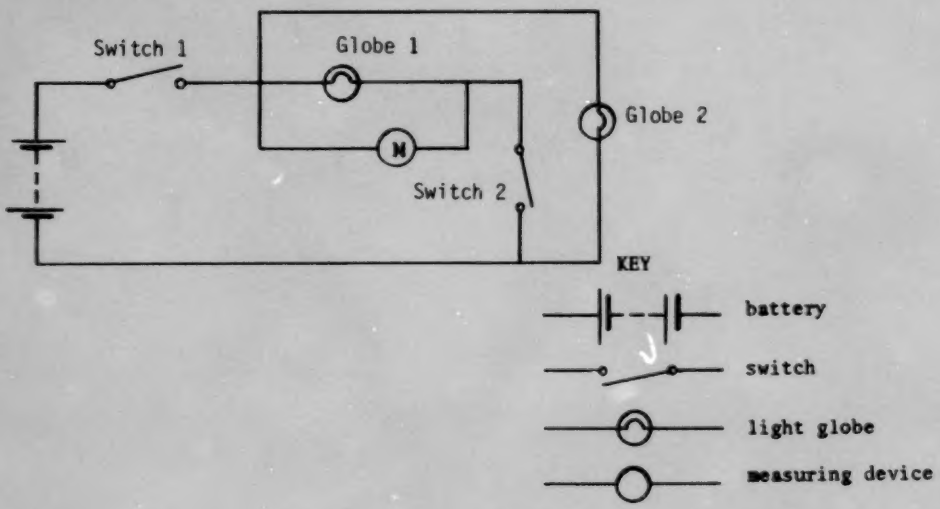
A dry cell ("torch battery")

A. converts chemical energy into electrical energy.
B. converts heat energy into electrical energy.
C. manufactures energy.
A2 D. stores electricity.

32

The next two questions refer to the following information and diagram.

The diagram represents a circuit with the following components, two light globes, two switches, a measuring device M and a battery.



Which globe or globes light(s) up when switch 2 is closed and switch 1 is open?

A. Globe 1 only.
B. Globe 2 only.
C. Both globes.
D. Neither globe.

B1

327

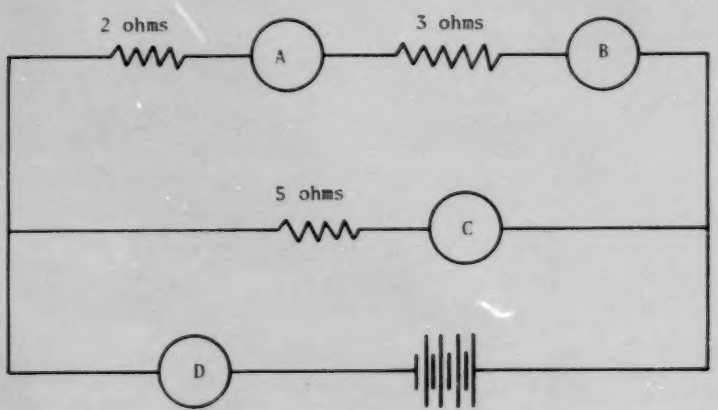
Which globe or globes light(s) up when switch 1 is closed and switch 2 is open?

A. Globe 1 only.
B. Globe 2 only.
C. Both globes.
D. Neither globe.

B1

328

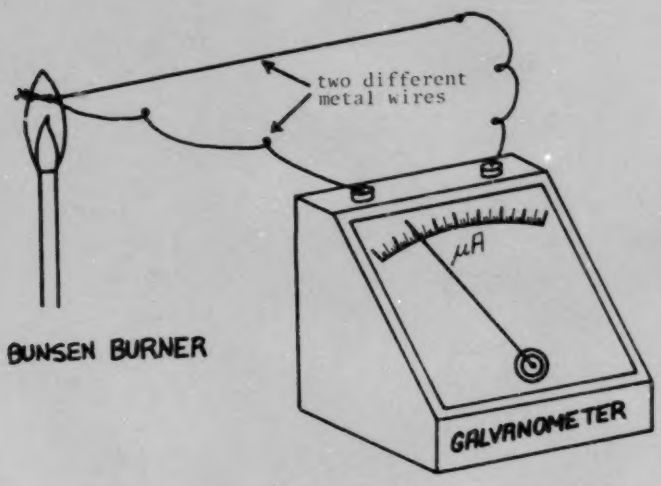
If the meters A,B,C and D in the circuit drawn below are all ammeters to measure electrical current, which meter would register the greatest current?



329

The next question refers to the following information.

Consider the diagram below in which two different metals connected to a very sensitive electricity meter are being heated at one of the joints.



In this experiment

A. electricity in the nichrome wire has set the bunsen alight.
B. heat from the bunsen has been changed into electricity.
C. putting another bunsen under the cold end will increase the amount of electricity being produced.
B3 D. winding the straight wire into a coil will increase the amount of electricity being produced. 330

In an electric light globe the filament is heated and glows to produce the light. This heating is caused by the

A. changing speed of the current through the wire.
B. resistance of the wire to the current.
C. changing direction of the current through the wire.
B3 D. reaction of the wire with the gas in the globe. 331

Very little energy escapes from the filament of a light globe by heat conduction. This is mainly because the

A. filament is too small.
B. glass keeps the heat in.
C. tungsten is a poor conductor.
D1 D. globe is evacuated. 332

In a solid, an electric current is a flow of

A. electrons. C. nuclei.
A4 B. ions. D. protons. 333

In a liquid, an electric current is a flow of

B1
A. electrons.
B. ions.
C. nuclei.
D. protons.

334

In the generator, electrical energy is obtained from

B3
A. heat energy.
B. kinetic energy.
C. magnetic energy.
D. solar energy.

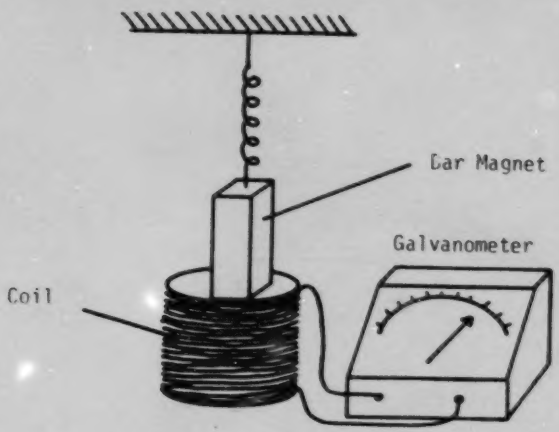
335

Which of the following groups of objects could be used to produce an electric current?

C4
A. magnet, voltmeter.
B. coil, ammeter.
C. magnet, coil.
D. ammeter, voltmeter.

336

The next question refers to the following diagram.



If a magnet is set moving up and down, the galvanometer will show

D3
A. no effect.
B. a direct current flowing in the coil.
C. a direct current in the magnet.
D. an alternating current in the coil.

337

An aqueous solution conducts electricity because it contains

C2
A. atoms.
B. electrons.
C. ions.
D. molecules.

338

The cost of operating a 1000 watt radiator for 6 hours at 5 cents per kilowatt hour would be

A3
A. $0.30
B. $3.00
C. $30.00
D. $300.00

339

For the same cost, you could run a 100 watt light globe and a 2000 watt radiator from a 240V supply for

A. 10 minutes and 20 minutes respectively.
B. 20 minutes and 1 minute respectively.
C. 100 minutes and 20 minutes respectively.

B2 D. 100 minutes and 2000 minutes respectively. 340

Which of the following appliances would use the most electricity if operated for the same length of time?

A. A transistor radio
B. An 1800 watt electric jug.
C. A 1kw electric radiator.

B1 D. A 60 watt lamp globe. 341

In a television tube the picture is produced in a fluorescent material at the front of the picture tube by

A. a beam of positive ions.
B. an electrical discharge.
C. a stream of electrons

C3 D. an electrolytic deposition of metal atoms. 342

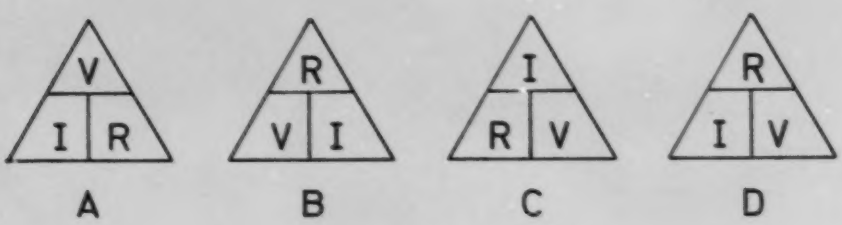
Which of the following pieces of equipment would be best to determine whether a dry cell is still useful?

A. Dry cell (1.5 volts).
B. Fuse (5 Amp).
C. Lamp globe (1.5 volts).

D3 D. Voltmeter (0.5 volts). 343

The diagram on the right can be used to find the various mathematical forms of Newton's second law. Cover the "unknown" value and the formula for calculating it will appear

Which diagram below best represents Ohm's Law?



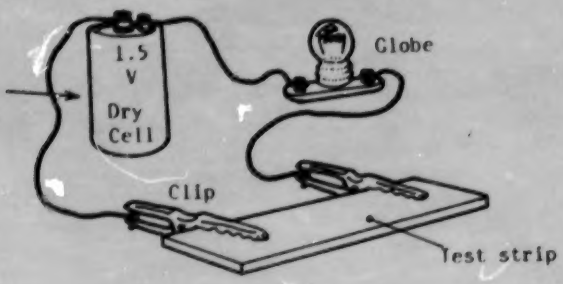
A1 344

A gas is enclosed in a discharge tube at low pressure and an electric current is made to pass through the gas until a glow discharge occurs. The colour of the discharge depends upon the

A. magnitude of the current.
B. glass of the tube.
C. material of the electrode.

D2 D. pressure used. 345

The diagram below shows a simple electric circuit. The clips on the wires would allow you to test which substances let a current pass through them.



The globes would light up if you connected the clips to a strip of

A5 A. copper. B. plastic. C. rubber. D. wood. 346

Metals are usually good conductors because they

A. have few electrons.
B. have many protons.
C. have some loosely held electrons.
C1 D. are solids. 347

A student was testing the electrical conductivity of various solutions. His results are set out in the table below:

SOLUTION	CONDUCTIVITY
Sugar	Poor
Methylated Spirit	Poor
Salt	Very good
Sodium bicarbonate	Good
Lemon juice	Good
Vinegar	Good

Which of the following statements could best be used as a summary of his results?

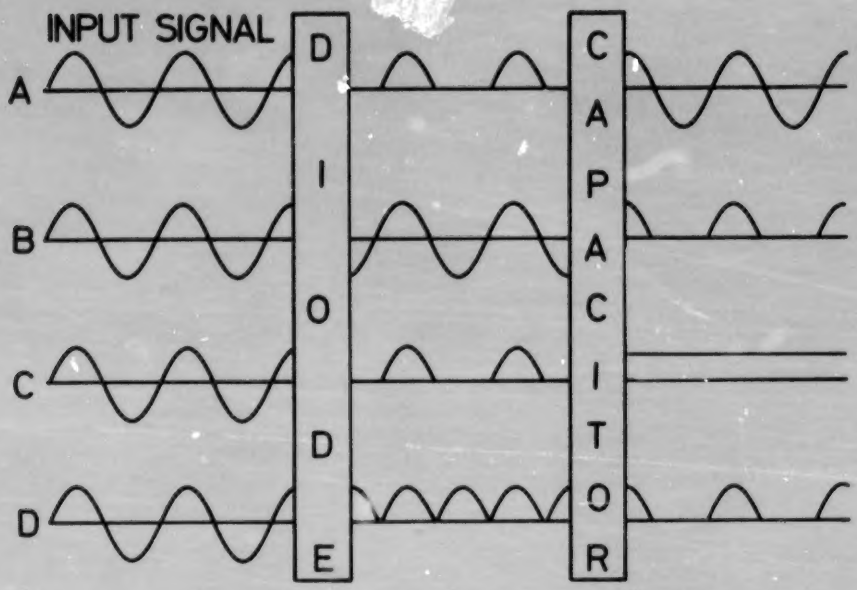
A. Organic compounds are not good conductors of electricity.
B. Acids are good electrical conductors.
C. Salts conduct electricity well.
3 D. Some compounds in solution conduct electricity better than others. 348

An electromagnet

A. has a steel core.
B. converts electric to magnetic energy.
C. is a permanent magnet.
D. has no magnetic field. 349

ELECTRONICS

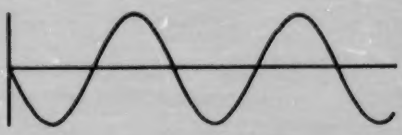
If we represent electric current (AC) by the usual sine curve, which diagram below is correct?



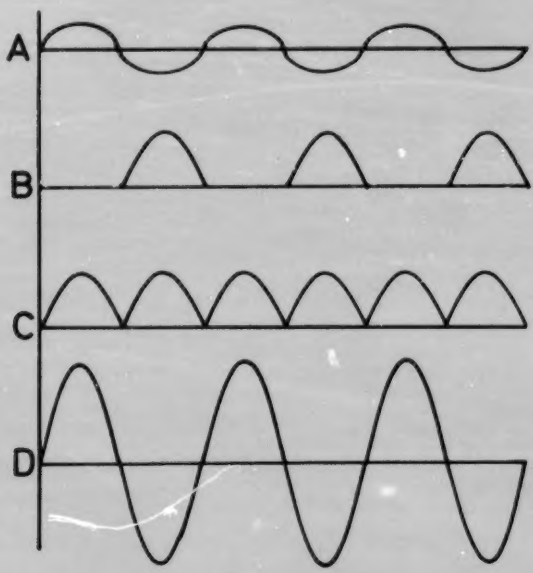
C1

350

If this diagram



represents an alternating current, then which diagram below represents rectified alternating current?



B1

351

A P-type semi conductor is formed when which two metals are alloyed?

A. Germanium and Indium.
B. Indium and Antimony.
C. Antimony and Tungsten.
A1 D. Tungsten and Germanium. 352

The equation which correctly describes the relationship in a transformer is

A. $V_s \times I_s = V_p \times I_p$

B. $V_s \times n_s = V_p \times I_p$

C. $V_s \times n_s = V_p \times n_p$

A1 D. $I_s \times n_p = I_p \times n_s$ 353

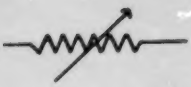
A transformer most resembles, in its operation, a(n)

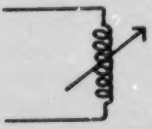
A. capacitor. C. solenoid.
B2 B. induction coil. D. variable resistor. 354

The symbol used in electronic circuitry for a variable capacitor is

A

C

B 

D 

C2 355

Because a TV uses rectified AC current, usually on a 50-cycle supply, it would flicker on and off 50 times per second. To overcome this problem, such circuits include a

A. capacitor. C. transformer.
A1 B. induction coil. D. variable resistor. 356

The capacitance of a capacitor is measured in

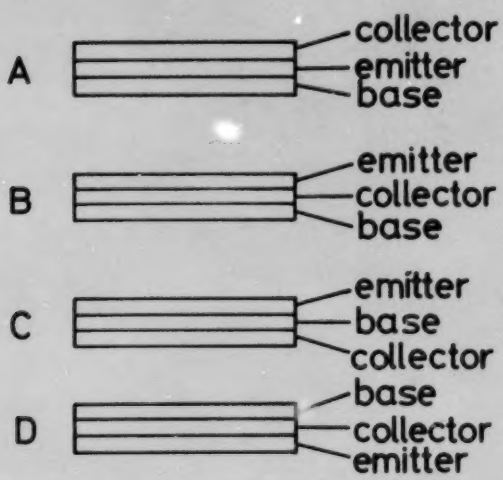
A. amps. C. volts.
B2 B. farads. D. watts. 357

A germanium diode works because

A. electrons can flow from an N-type semi-conductor to a P-type semi-conductor, but not the other way.
B. electrons can flow from the cathode to the anode only when the anode voltage is positive with respect to the cathode.
C. metals which make up the diode combine to form an alloy which only allows half the amount of current to flow.
A1 D. An N-P-N type semi-conductor channels electrons through the centre only when the voltage is in a particular direction.

358

Which diagram correctly labels the components of an N-P-N type transistor?



C1

359

What is formed when an N-type semi-conductor is layered next to a P-type semi-conductor?

A. Capacitor. C. Transistor.
B3 B. Diode. D. Triode.

360

A transformer has 1000 turns in the primary coil, and 500 in the secondary coil. Which statement is correct?

	Secondary Voltage Equals	Secondary Current Equals
A	half primary voltage	half primary current
B	half primary voltage	twice primary current.
C	twice primary voltage	half primary current
B1 D	twice primary voltage	twice primary current

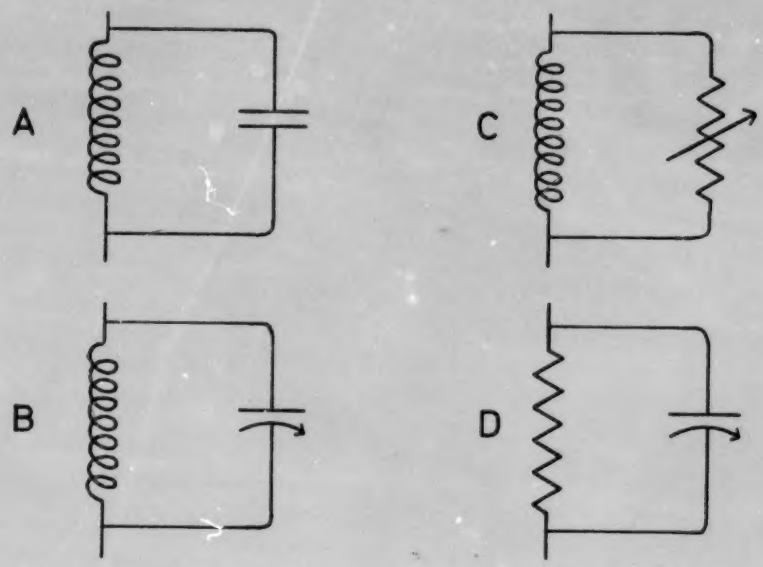
361

Electric current is said to be <u>rectified</u> when it is

A. transformed to a higher voltage.
B. transformed to a lower voltage.
C. changed in direction of flow.
D3 D. changed from AC to DC.

362

Which one of the following best represents a simple tuning circuit?



B1

363

A transformer is used to

A. raise or lower AC voltages.
B. discharge lightning.
C. operate a transistor radio from batteries.
A5 D. keep water boiling.

364

Which of the following components is *unnecessary* in the detector circuit of a simple radio receiver?

A. Capacitor.
B. Coil.
D1 C. Diode.
D. Resistor.

365

Which circuit component will rectify electric current?

A. Diode.
B. Transformer.
A1 C. Capacitor.
D. Variable resistor.

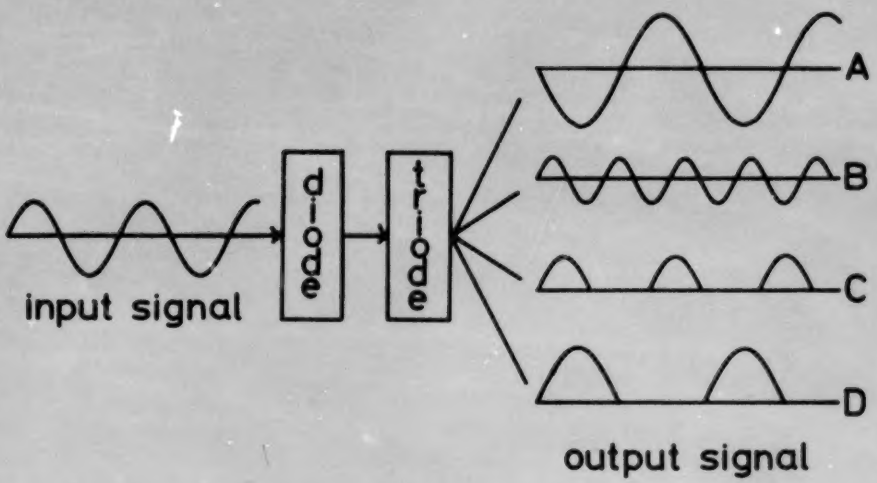
366

The term 'alternating current', as used in electronics, means

A. frequent "black-out" occur.
B. frequent and regular switching in the potential difference.
C. occasional changes in current strength.
B1 D. occasional changes in the potential difference.

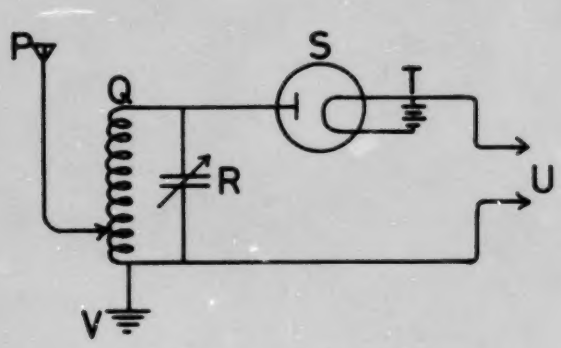
367

Which output signal best represents the effect of the diode - triode combination on the input signal?



D1 368

The next three questions refer to the diagram of a simple radio circuit below.



Which labelled part of the circuit would be attached to the station selecting knob?

C1 A. P B. Q C. R D. T 369

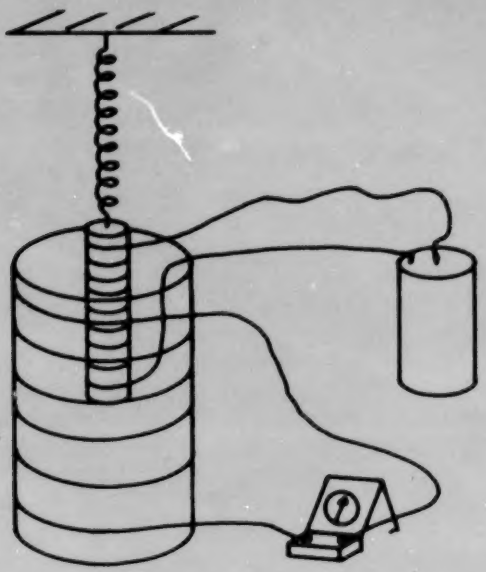
Which labelled part of the radio first receives the signal from the broadcasting station?

A2 A. P B. Q C. S D. V 370

What is most likely to be connected across the termals at "U"?

A. An external power source.
B. Connections for batteries.
C. Volume control knob.
D2 D. A speaker or headphones. 371

The next question refers to the diagram below.



Look carefully at the diagram above. When the solenoid is oscillating

A. a current will flow through the meter.
B. a current will flow to and fro through the meter.
C. the second solenoid will not be affected by the first.
B1 D. the spring will extend only once and the force of the current will hold it in the second solenoid.

372

In a step-up transformer the

A. number of turns in the primary coil is greater than the number in the secondary coil.
B. primary voltage is greater than the secondary voltage.
C. primary power is greater than the secondary power.
D1 D. primary current is greater than the secondary current.

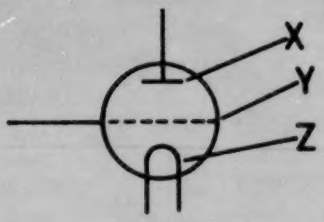
373

An inductor works because

A. an induced magnetic field opposes a sudden build-up of current.
B. a solenoid is used to make a wire of the same frequency as a broadcast signal.
C. its high resistance causes current to flow into the capacitor in the tuning circuit.
A2 D. its resistance can be changed by turning the tuning knob and so picking up a different station.

374

Consider the electrodes labelled X, Y and Z in the triode valve below



The charge on each electrode when the triode is being used to amplify or signal is

	X	Y	Z
A	+	-	-
B	+	+	-
C	-	+	+
D	-	-	+

B1 375

Another name for a capacitor is a(n)

A. condenser.
B. inductor.
C. induction coil.
D. solenoid.

A2 376

The capacitance of a capacitor will be largest when the plates are

A. large and close together.
B. large and further apart.
C. small and close together.
D. small and further apart.

B1 377

A capacitor is used in an electric circuit to

A. change the voltage across a resistor.
B. increase the current flowing.
C. amplify an input signal.
D. store electrical energy for later use.

D2 378

In a diode valve, the anode can be positive or negative with respect to the cathode. When the anode is negative with respect to the cathode, then the current flowing through the diode will be

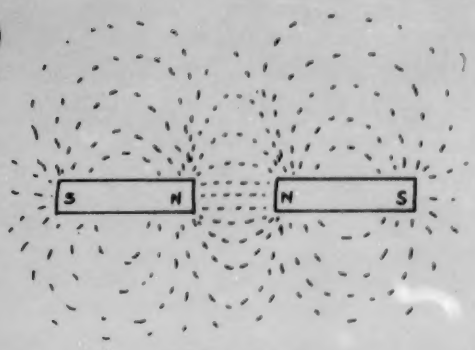
A. a little more than when the anode is positive.
B. a little less than when the anode is positive with respect to the cathode.
C. equal to that when the anode is positive.
D. zero.

D1 379

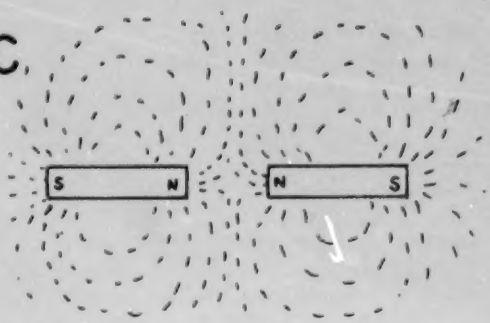
MAGNETISM

Students often plot magnetic fields by sprinkling iron filings around a magnet. The magnetic field lines are found always to join North and South Poles and they never cross. Given this information, which one of the following diagrams shows a correct magnetic field pattern?

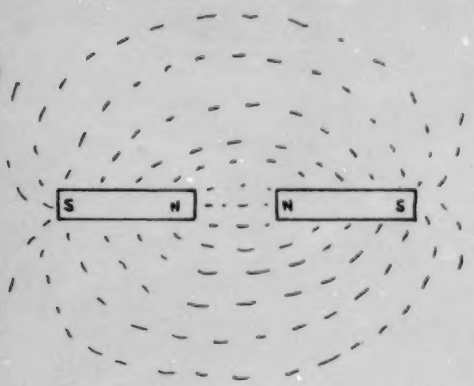
A



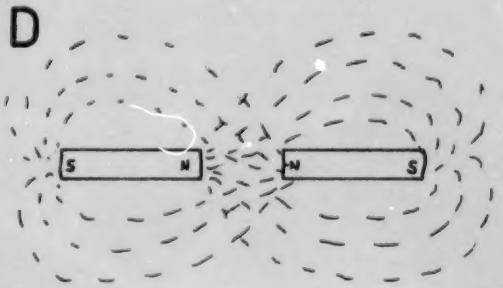
C



B



D



C3 380

If you break a bar magnet across its centre you will probably obtain

A. two magnets, one having a north pole but no south pole, the other having a south pole but no north pole.
B. two pieces which are not magnets since one has a north pole only and the other has a south pole only.
C. one piece having a north pole and a south pole, and one piece having no poles.

D3 D. two magnets each having a north pole and a south pole. 381

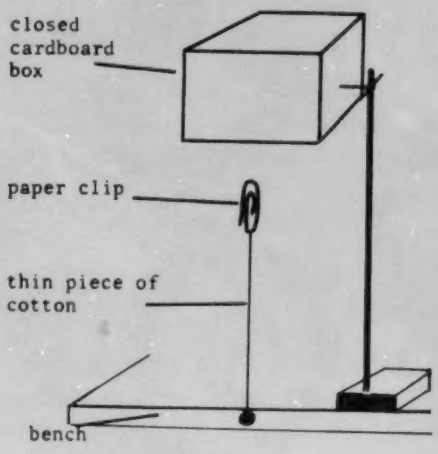
If you spill some iron filings an easy way to pick them up would be to use a magnet. However, the filings will stick to the magnet and you will have difficulty getting them off. A good way to solve this problem would be to

A. wrap the magnet in tissue paper before using it.
B. heat the magnet and allow it to cool before using it.
C. pass a small electric current through the magnet and the filings will fall off.

A4 D. place the magnet in water before using it. 382

This question refers to the diagram on the right.

An ordinary metal paper clip is stationary in air just below a closed cardboard box. It is held in position by a thin piece of cotton attached to the bench.



If the cotton were cut, the clip would

A. rise up to the box.
B. fall to the bench.
C. not move from its position.
D. float away sideways.

A1.

383

Given a bar magnet and a solenoid, which one of the following methods would induce the greatest current in the solenoid?

A. Move the bar magnet quickly inside the solenoid.
B. Rest the bar magnet inside the solenoid.
C. Move the bar magnet quickly beside the solenoid.
D. Rest the bar magnet near the solenoid.

A.2

384

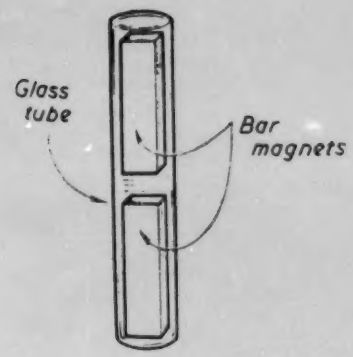
An electric current in a wire produces a magnetic field. In which of the following devices is this effect important to the operation of the device?

A. Incandescent light globe.
B. Fluorescent light tube.
C. Electric blanket.
D. Electric bell.

D.3

385

Consider the following experiment.



The best explanation for the experiment is that

A. antigravity has been discovered.
B. magnets exert a force of attraction.
C. the two ends of the magnets are different.
D. two similar ends will repel.

D4. 386

If a straight wire is suspended between the poles of a horseshoe magnet and an electric current passed through the wire, the wire moves.

This fact provides the basic information for the construction of

A. an electric motor.
B. a transformer.
C. an induction coil.
D. a generator.

A.1 387

Which one of the following particles would NOT be deflected when moving in a magnetic field?

A. Electron.
B. Proton.
C. Neutron.
D. Metallic ion.

C.2 388

Observe the following diagram of a magnetic field.

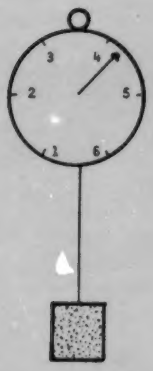
Which of the sequences of magnetic poles tabulated would produce the pattern shown in the above diagram?

	1	2	3	4
A.	S	S	N	N
B.	N	S	N	S
C.	S	N	S	N
D.	N	S	S	N

D1. 389

MASS AND DENSITY

A student weighed an object in air and in water by using a spring balance. The diagrams below show the readings.



The force exerted on the object by the water is nearest to

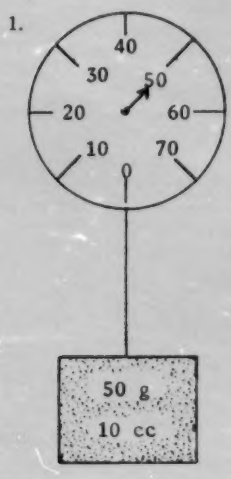
A. $3\frac{3}{4}$ units.

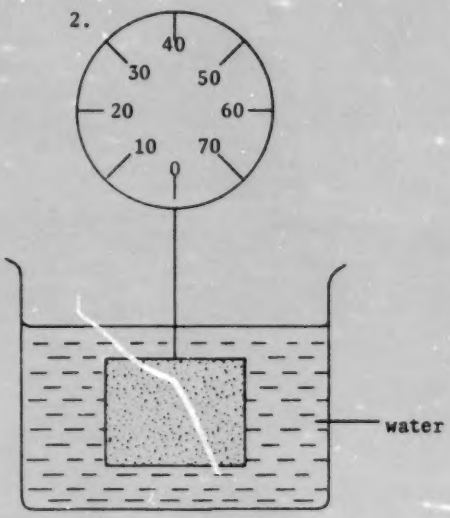
B. 4 units.

C. $\frac{1}{2}$ unit.

D. 3 units.

C.1 390



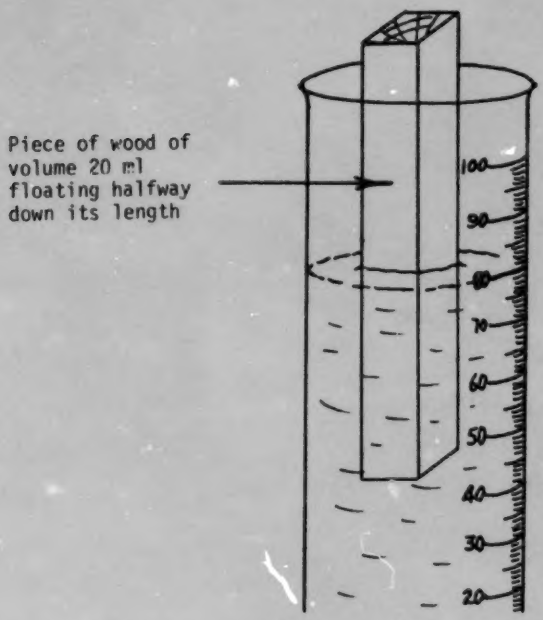


The object suspended from balances 1 and 2 above has a volume of 10 cc. Its mass, as indicated on scale 1 is 50 g.

What would be the reading on scale 2?

B1. A. 10 g B. 40 g C. 50 g D. 60 g 391

The next question refers to this diagram.



The diagram above shows a length of wood of volume 20 ml floating halfway down its length in a measuring cylinder of water. The volume of water in the measuring cylinder is -

A. 80 ml
B. 70 ml
C. 60 ml
D. 50 ml

B3. 392

The Plimsoll line marks the safe water level to which a ship may sink when it is loaded.

It is painted on the side of a ship and may look like:

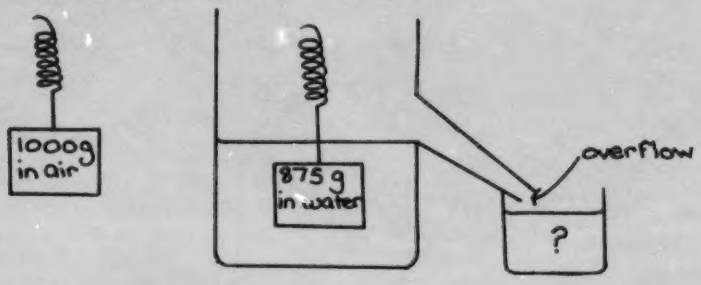
FW = level in fresh water.
S = level in salt water in summer.
W = level in salt water in winter.

The three different levels are to allow for

A. different loads which the ship may carry.
B. changes in weather conditions which affect the ship's stability.
C. heavier loads sinking further into the water than lighter loads.
D. differences in water density on different occasions.

D3. 393

The diagrams show an object weighed in air and submerged in a container of water.
Before the object was placed in the container of water, the water level was the same as that shown.



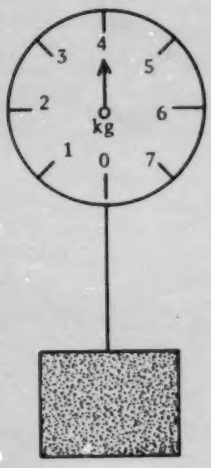
394

How much water would be in the small overflow container?

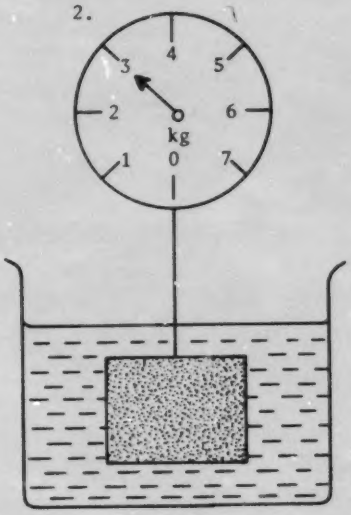
A. 100 mL. B. 125 mL. C. 875 mL. D. 1000 mL.

B3.

1.



2.



The mass of an object in air is shown on scale 1 and its mass in water on scale 2.

What is the volume of the object?

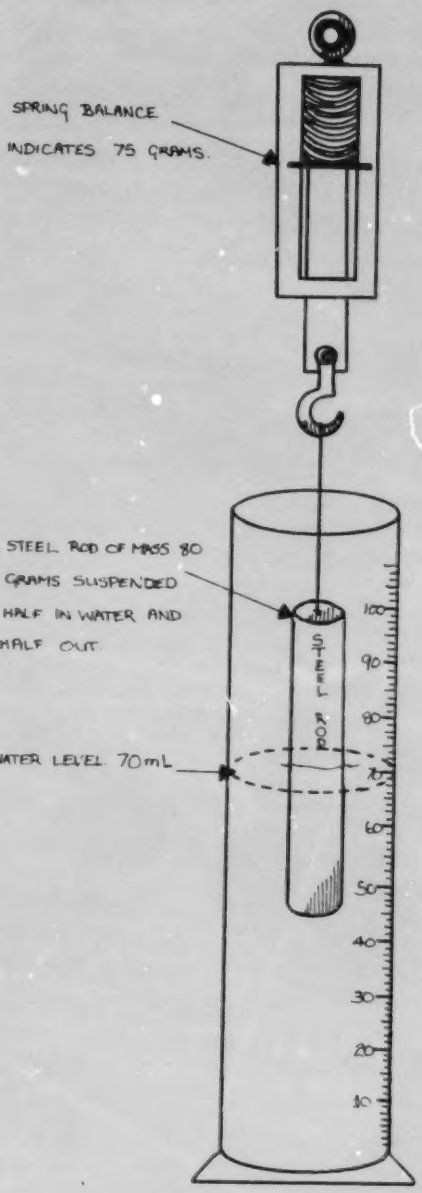
A. 1 cc B. 10 cc C. 100 cc D. 1000 cc

D1.

395

The next three questions refer to this diagram.

The diagram shows an 80 gram steel rod suspended by a spring balance in a cylinder of water so that the rod is half submerged. The spring balance shows 75 grams and the level of the water in the cylinder is 70 mL. Given that the density of water is 1 gram/mL answer the following questions.



If the rod were withdrawn from the water, then the level of the water would drop to

A. 65 mL.
B. 60 mL.
C. 55 mL.
D. 50 mL.

A2.

The volume of the steel rod is

A. 5 mL.
B. 10 mL.
C. 15 mL.
D. 20 mL.

B2.

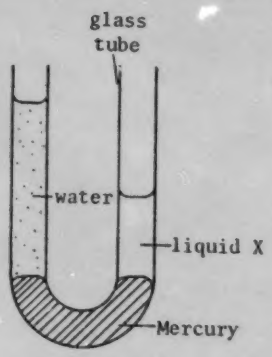
The density of the steel rod is

A. 5.0 gram/mL.
B. 7.5 gram/mL.
C. 8.0 gram/mL.
D. 10.0 gram/mL.

C1.

396 397 398

From the information presented by the diagram on the right, what is the most probable density of liquid X?



A. 0.5 g/mL.
B. 1.0 g/mL.
C. 1.5 g/mL.
D. 2.0 g/mL.

D1.

399

Which weighs more - a bottle full of cold water or the same bottle full of hot water?

A. Cold water because it has lost some of its dissolved gases.
B. Cold water because it is denser than hot water.
C. Hot water because it has lost some of its dissolved gases.
D. Hot water because more can fit in the same sized bottle.

B3.

400

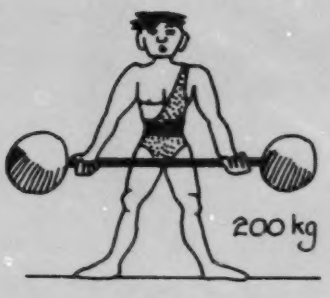
Which object in the table below would be most likely to float in methylated spirits, density 0.8 g/mL?

OBJECT	MASS (g)	VOLUME (ml)
A	5	8
B	10	10
C	15	12
D	20	14

401

A3.

A student weight-lifter could lift a maximum of 200 kg off the floor to waist level, as shown.



If the substance making up the weights has a density of 10 grams/cc, what "weight" could the student lift from the bottom of a pool to waist height, water level being just above his waist?

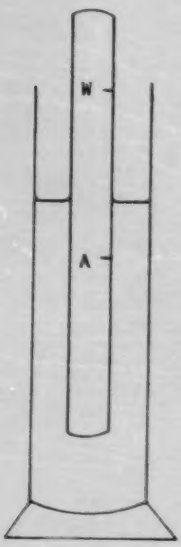
A5
A. About 180 kg.
B. 200 kg, as before.
C. About 220 kg.
D. Almost 300 kg.

402

Icebergs (frozen freshwater) float in the ocean (saltwater). From this it is possible to conclude

D2
A. saltwater is less dense than ice.
B. freshwater is less dense than ice.
C. when seawater freezes it loses its salt.
D. ice is not as dense as water.

403



The diagram on the left shows a "paddle-pop stick hydrometer" with graduation marks for water (W) and acid (A) shown. The density of the acid used was 1.6 grams per millilitre

The table below gives the density of four liquids, one of which is in the measuring cylinder:

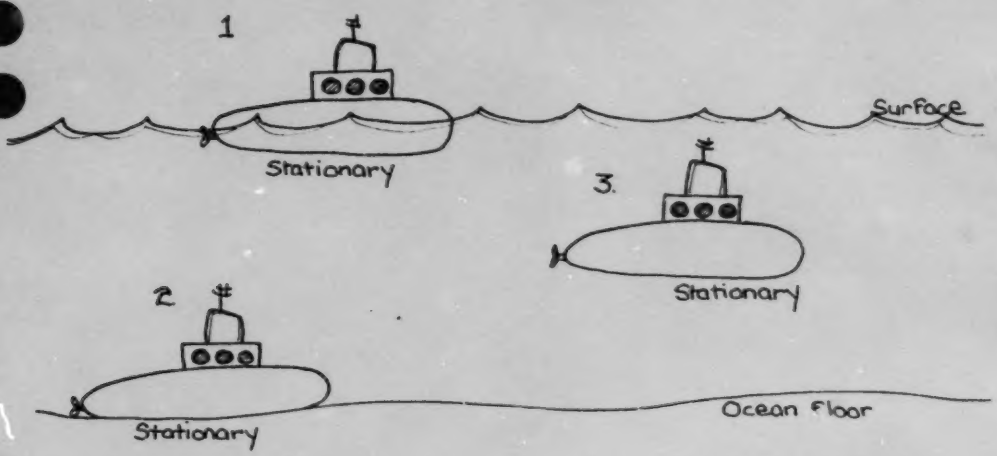
SUBSTANCE	DENSITY (g/mL)
A	1.2
B	1.4
C	1.6
D	1.8

Which substance is in the measuring cylinder?

B1.

404

The next question refers to this diagram.

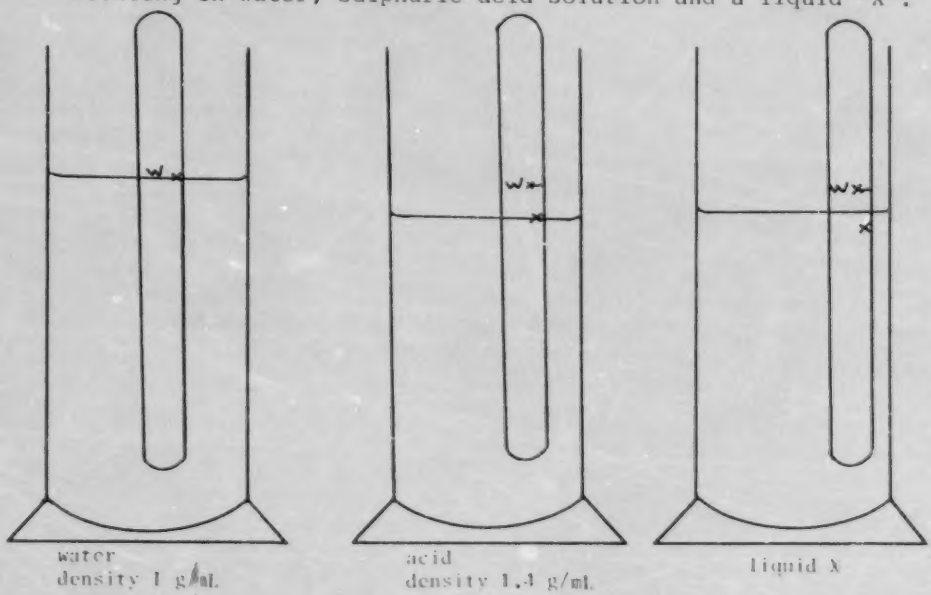


Which of the submarines drawn above must have an average density equal to that of water?

A. 1 and 3 only.
B. 1 and 2 only.
C. 3 only.
D. 1 and 2 and 3.

C4. 405

The diagrams below show a "paddle-pop stick hydrometer" floating in water, sulphuric acid solution and a liquid "X".



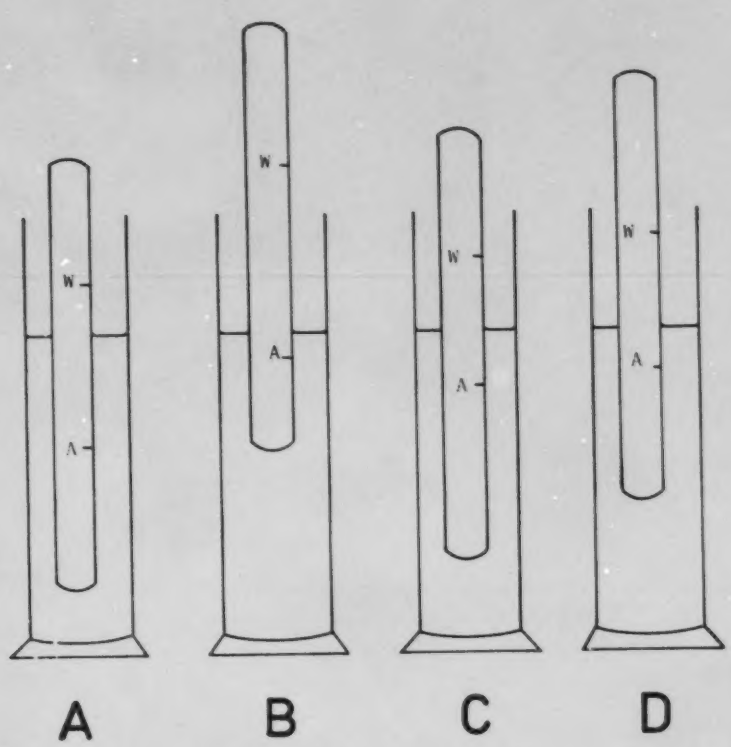
The density of liquid X in g/mL is closest to

A. 0.6 B. 0.9 C. 1.2 D. 1.6

C3. 406

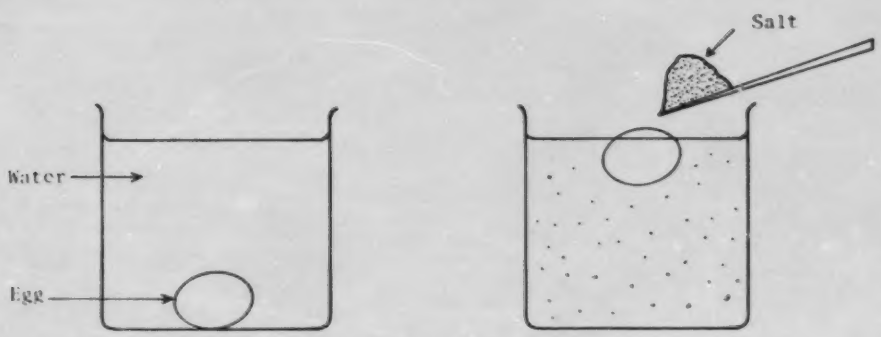
The diagrams show four "paddle-pop stick hydrometers" in four liquids. On each is shown the graduation mark for water (density 1 g/mL) and an acid (density 1.6 g/mL).

Which container contains a liquid of density 1.4 g/mL?



407

D1.



A student noticed that an egg sank in water, but as salt was added to the water, the egg began to float.
Which statement below best explains this?

A. The egg is denser than the water when salt is added.
B. Salt reacts with the eggshell forming a gas which buoys the egg up.
C. Salt water is more dense than unsalted water.
D. The egg slowly absorbs salt by osmosis and rises.

408

C3.

A native of the planet Xenos tried to sell to a visiting space traveller an ornament which he said was pure gold.

The traveller suspected he was being cheated, so he conducted the following experiment.

He weighed the ornament, and then took equal weights of gold and silver and found the volume of all three. His results were

	Volume	Weight
Ornament	8 units	10 units
Gold	7 units	10 units
Silver	13 units	10 units

He could correctly conclude that

A. mainly gold with a little silver added.
B. mainly silver with some gold added.
C. approximately 50-50 gold and silver.
D. 7 parts gold to 13 parts silver.

A2. 409

The next three questions refer to this information.

mass object in air	50g
mass object in water	40g
mass object in liquid X	45g

The volume of the object referred to by this information is closest to

A. 5 cc. B. 10 cc. C. 15 cc. D. 20 cc.

B1. 647

The density of the object is closest to

A. 2 g/cc. B. 4 g/cc. C. 5 g/cc. D. 10 g/cc.

C2. 648

The density of liquid X is closest to

A. 0.5 g/mL. B. 2 g/mL. C. 2.5 g/mL. D. 5 g/mL.

A1. 649

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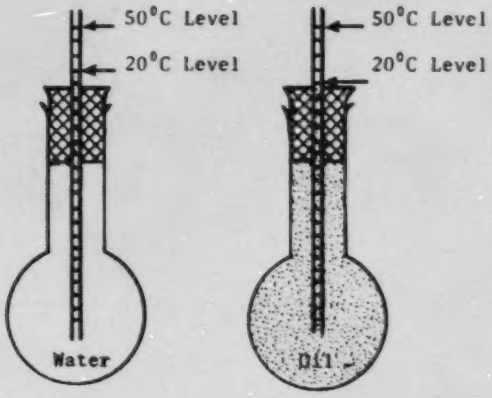
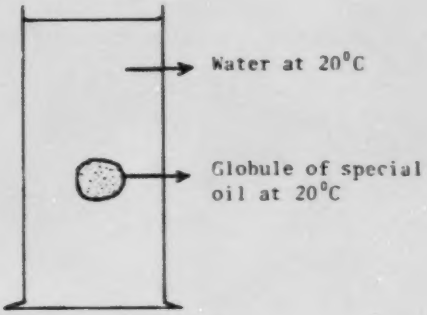
410 411 412

Pictured are two identical flasks, one filled with water, the other a special oil. At 50°C the levels in both flasks are the same. At 20°C the levels drop to those shown on the diagrams.



At 20°C, a globule of the special oil placed in the middle of a column of water neither rises nor sinks.

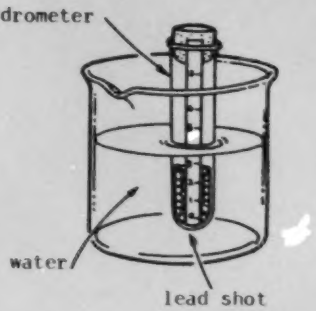


If the column of water were slowly warmed up to 50°C you would expect the suspended globule of oil to

A. sink to the bottom of the column.
B. rise to the top of the column.
C. remain where it is.
D. spread evenly through the entire column.

A student tested a home-made hydrometer in water as shown in the diagram below. He found that it sank to mark 4 on the scale.

He then used it to test four different liquids, one of which was glycerine. The scale readings in each of the four liquids were recorded in the table.



Liquid tested	Hydrometer scale reading
I	$4\frac{1}{2}$
II	5
III	$3\frac{1}{2}$
IV (water)	4

Knowing that glycerine is more dense than water, pick out which of the four liquids was glycerine.

A. Liquid I.
B. Liquid II.
C. Liquid III.
D. Liquid IV.

C2 414

The table below shows the weight (in weight units) at various pressures and temperatures of 1 litre of air.

TEMPERATURE (°C)	Weight at pressure of 740mm Hg (Weight Units)	Weight at pressure of 740mm Hg (Weight Units)
15	1.19	1.26
20	1.17	1.24
25	1.15	1.22

From the information in the table you could say that 1 litre of air at a particular pressure

A. always has the same weight.
B. increases in weight as the temperature increases.
C. varies in weight with height above sea level.
D. increases in weight as the temperature decreases.

D3 415

A pin can be made to "float" on the surface of water if it is carefully lowered onto the surface.

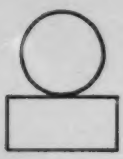
Four beakers were set up with pins "floating" in them, and a substance was added carefully to each. Which substance would be most likely to cause the pin to sink?

A. Detergent.
B. Ice.
C. Oil.
D. Mercury.

A1. 416

The diagram below show a ping-pong ball, mass 1 gram, volume 20 cc attached to four other objects. The volumes and masses of the four objects are shown.

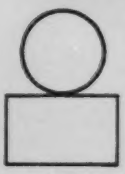
A.



Vol = 10 cc

mass = 30 g

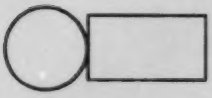
C.



Vol = 15 cc

mass = 60 g

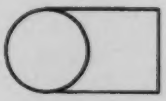
B.



Vol = 20 cc

mass = 49 g

D.



Vol = 15 cc

mass = 32 g

A3 Which combination will float? 417

The substance graphite is more dense than water. If a solid lump of it is placed in water it will probably

A. sink immediately.
B. sink only if it becomes waterlogged.
C. sink at first but rise again as it absorbs water.
A3 D. sink gradually as some of it dissolves in the water. 418

Scientists on the planet Xenos discovered a new metal and by measuring its mass and volume found it to have a density of 4g/cc.
Which object below is most probably composed of substance X?

Object	Mass in Air	Mass in Water
A	400g	300g
B	600g	400g
C	800g	500g
D	1000g	600g

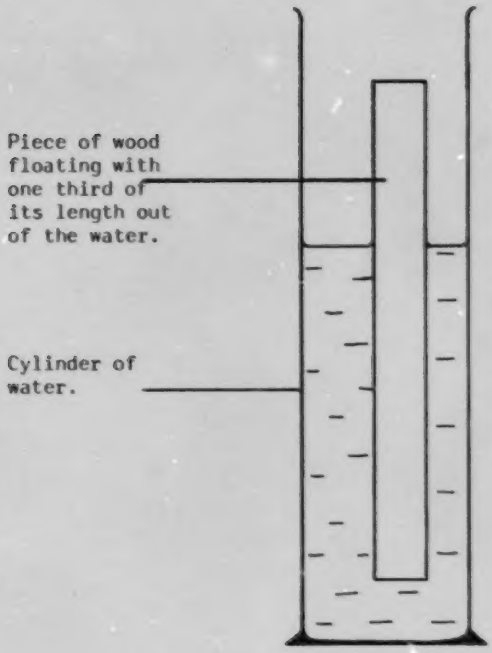
A2 419

P,Q,R and S are different substances. Their masses and volumes are given in the table below.

	P	Q	R	S
Mass (gm)	100	200	600	100
Volume (cm^3)	50	50	100	50

C1 Which substance has its particles most closely packed together? 420

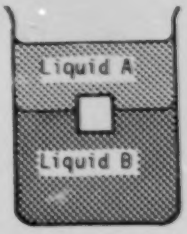
The next question refers to this diagram.



The diagram above shows a length of wood floating with one third of its length out of the water and the other two thirds of its length submerged. Concerning the weight of the piece of wood, the correct statement is that the wood has lost

A. none of its weight.
B. one third of its weight.
C. two thirds of its weight.
A1 D. all of its weight.

The diagram below, shows an object floating in a beaker which contains two liquids which do not mix.



The position at which the object floats indicates that

A. the object is less dense than both liquids.
B. the object can absorb liquid A but not liquid B.
C. liquid A is more dense than liquid B.
D4 D. the object is more dense than liquid A, but less dense than liquid B.

The next three questions refer to the following information.

Diagram 1: shows a section of a measuring cylinder containing water.

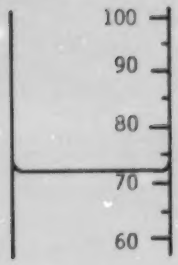
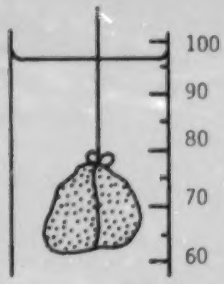


Diagram 2:shows the same section after a rock has been submerged in the water.



The volume of the rock is

A4 A. 24mL. B. 70mL. C. 72mL. D. 96mL. 421

If the rock in the example above has a mass of 60g then its density is

A. 1.5 g/mL.
B. 2.0 g/mL.
C. 2.5 g/mL.
D. 3.0 g/mL. 422

While the above rock is immersed in water, its weight

A. remains unchanged.
B. is completely lost.
C. is greater than if it were in air.
D2 D. is less than its weight in air. 423

The next 2 questions refer to the following information.

The table shows the masses of four different objects when weighed in air and water.

OBJECT	MASS IN AIR (g)	MASS IN WATER (g)
A	50	30
B	100	40
C	150	120
D	200	150

B1 Which object has the greatest volume? 424

C1 Which object is the densest? 425

A solid cube, with a side of 10 cm has a mass of 11 500 grams. A data book gives the following densities of some metals:

magnesium	1.74 g cm^{-3}
copper	8.96 g cm^{-3}
gold	19.3 g cm^{-3}
lead	11.4 g cm^{-3}

Of these substances, the cube is most likely to be made of

A. copper B. gold C. lead D. magnesium

C.3 426

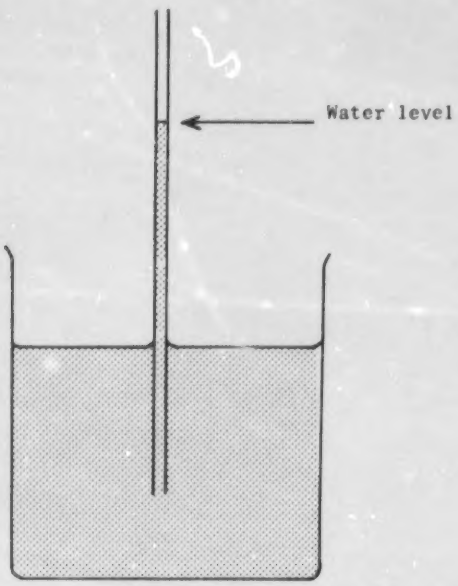
PRESSURE

In the past a number of serious accidents occurred when people threw pressure pack spray cans into fires. Now aerosol spray cans carry the warning "DO NOT INCINERATE". This is now necessary to warn people of the danger of an explosion. The bursting of the can is caused by

A. the rapid cooling of the gas as it escapes from the can.
B. the increased pressure of the gas as it is heated in the can.
C. the fact that gas heated under pressure quickly reaches its ignition temperature.
B4 D. the elasticity of the gas trapped under pressure in the can.

427

The next question refers to the following diagram.



When a thin glass tube (capillary) is placed in a beaker of water, the water rises up the tube higher than the level of water in the beaker. This is shown in the diagram above.

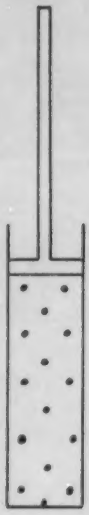
The best explanation for this is that the water molecules are

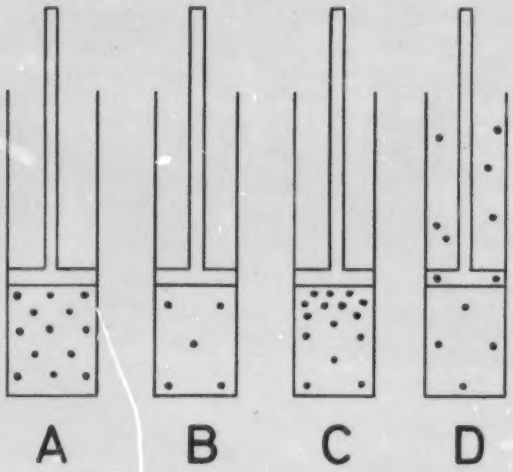
A. drawn up by air pressure.
B. forced up by water pressure.
C. attracted to the wall of the tube.
1 D. repelled by other water molecules.

428

The diagram on the right shows a syringe containing air. The particles of air are represented by dots.

Which of the diagrams below best represents this syringe after the plunger has been pushed in?

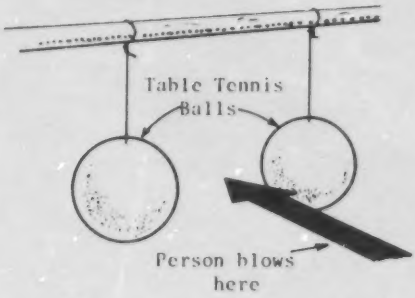




A2

429

Two table tennis balls, three inches apart, are hanging from a rod as shown.



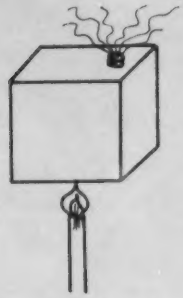
If a person blows between the two balls they will

A. move apart since there is a reduced pressure at right angles to the direction of air movement.
B. move apart since there is an increased pressure at right angles to the direction of air movement.
C. move towards the person since there is a reduced pressure in the direction of air movement.
D. move together since there is a reduced pressure at right angles to the direction of air movement.

D1

430

The next question refers to these diagrams.



CAN CONTAINING A LITTLE WATER WHICH IS BOILING

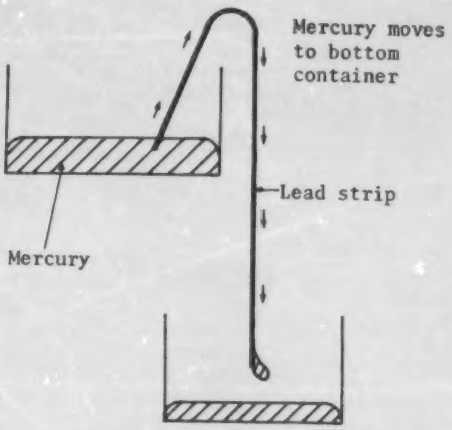
THE CAN A FEW SECONDS AFTER THE HEAT WAS REMOVED AND THE CAP SCREWED ON TIGHTLY

The crushed can in the second diagram was the result of

A. steam pressure.
B. water pressure.
C. heat pressure.
D. air pressure.

D3. 431

This apparatus was set up and left to stand for several days. At the end of this time it was observed that the mercury had transferred from the top container to the bottom container.



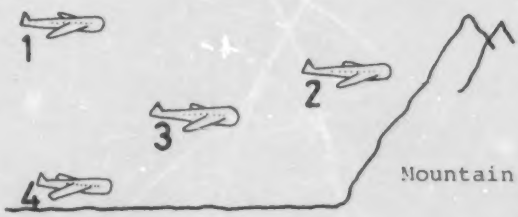
This experiment would best be described as

A. a mercury siphon.
B. the mercury pump.
C. evaporation of mercury.
D. diffusion of mercury.

A2. 432

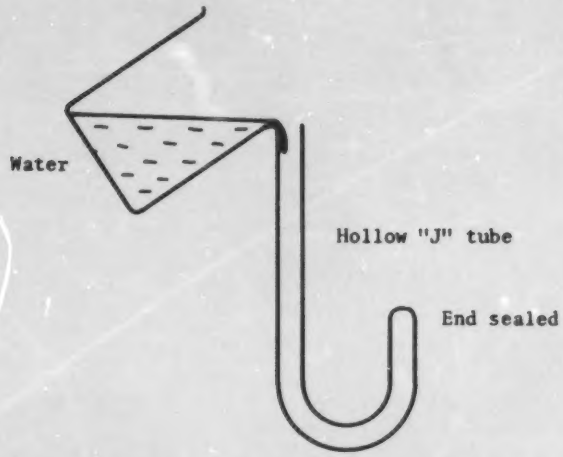
The readings on the barometers in planes 1,2,3, and 4

A. increase as you go from plane 1 to plane 4.
B. decrease as you go from plane 1 to plane 4.
C. increase and than decrease as you go from plane 1 to plane 4.
A2 D. decrease and then increase as you go from plane 1 to plane 4.

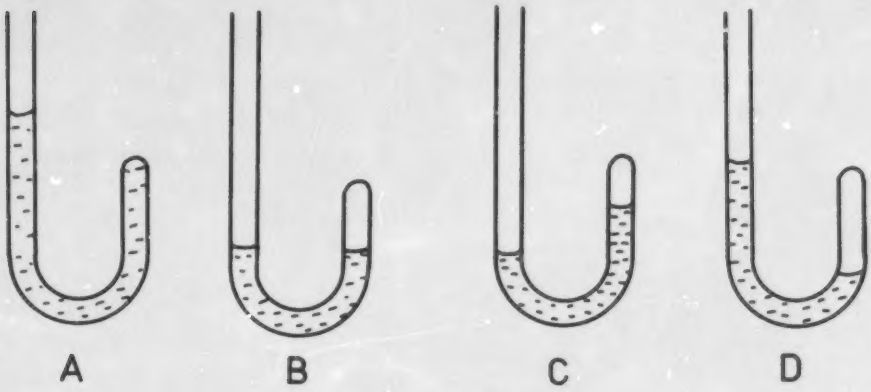


433

The next question refers to this diagram.



Water is poured into the J-tube pictured above.
Of the following diagrams, which best illustrates where the water levels will finish up.



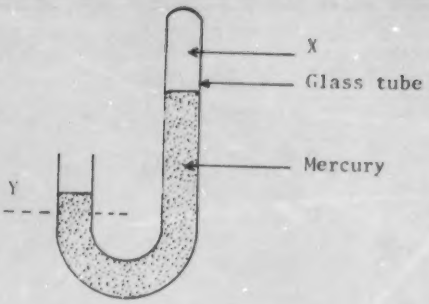
D.1 434

What unit is used to measure air pressure in tyres?

A. Celsius degrees.
B. Kilograms.
C. Pascals.
D. Newtons.

C1. 435

Which statement about the apparatus shown on the right is TRUE?



A. The set-up of the apparatus is not possible as the mercury would run out of the open end.

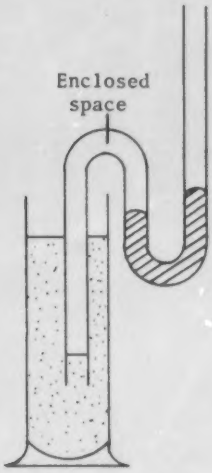
B. If the tube were punctured at level Y most of the mercury would run out of the apparatus.

C. The system is stable only if space "X" is a vacuum, otherwise the mercury would spill out.

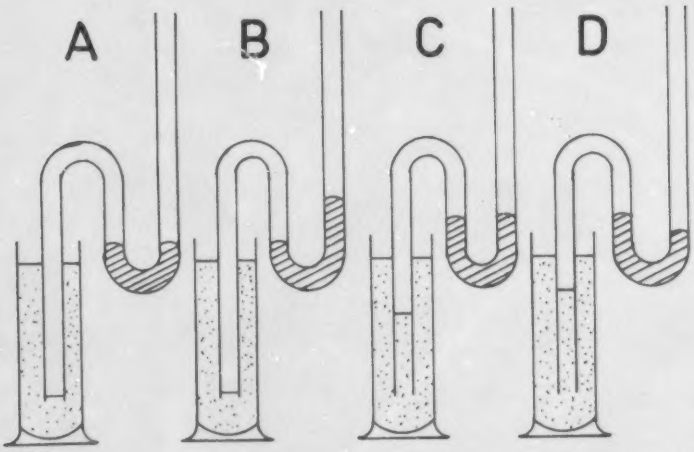
D. If the atmospheric pressure increased, space "X" would decrease in size.

D1.

436



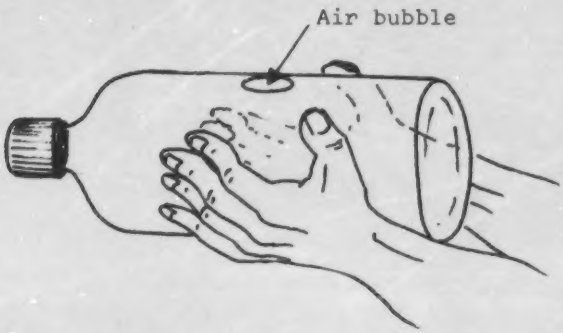
Some air was added to the enclosed space in the apparatus drawn (left). Which diagram (below) best shows what could happen as a result of this?



B2.

437

The next question refers to this diagram.

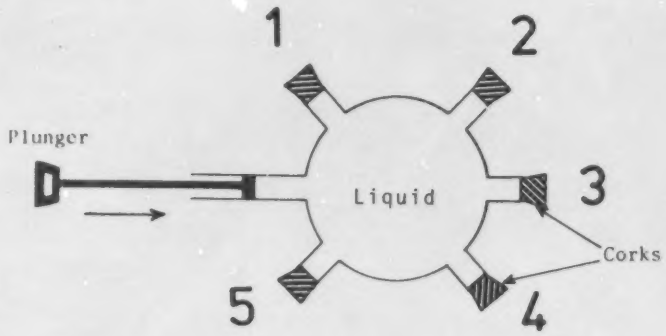


A student squeezed the sides of a clear plastic bottle. The top was tightly sealed on. The bubble in the bottle would

A. get smaller.
B. get bigger.
C. stay the same size.
D. dissolve in the water.

A1. 438

Consider the diagram below.

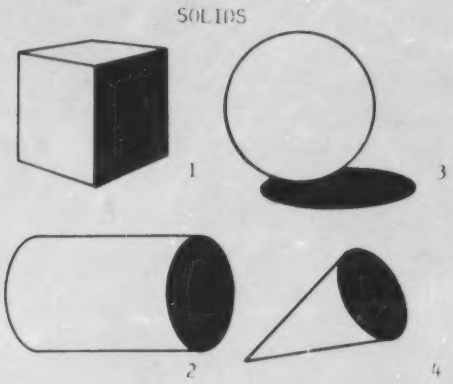


The diagram shows a container with five identically corked holes of equal size. If the plunger is pushed sharply in, what is most likely to happen?

A. Plug 3 will blow out only.
B. Plug 3 will blow out first, followed by plugs 2 and 4.
C. All 5 plugs will blow out.
D. Plugs 2, 3 and 4 will blow out first, followed by 1 and 5.

C3. 439

The next question refers to the following diagram.



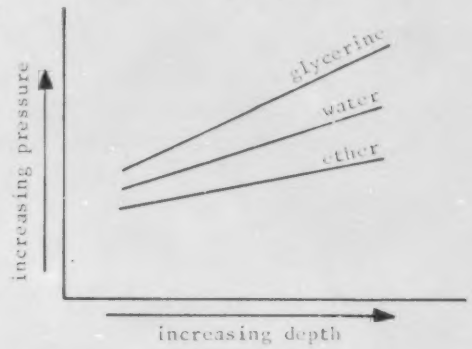
Each of the solids above has the same mass. Which one of the solids would exert the greatest pressure if it was resting on its dark side?

A. No. 1 - cube.
B. No. 2 - cylinder.
C. No. 3 - sphere.
D. No. 4 - cone.

C1

440

These graphs compare the rates at which the pressure in different liquids changes as the depth increases.



The graphs indicate that for any given depth in all the liquids

A. the pressure exerted by water is greater than that exerted by either glycerine or ether.
B. the pressure exerted by ether is greater than that exerted by either water or glycerine.
C. the pressure exerted by all three liquids is the same.
D. the pressure exerted by water is less than that of glycerine but greater than that of ether.

D3

441

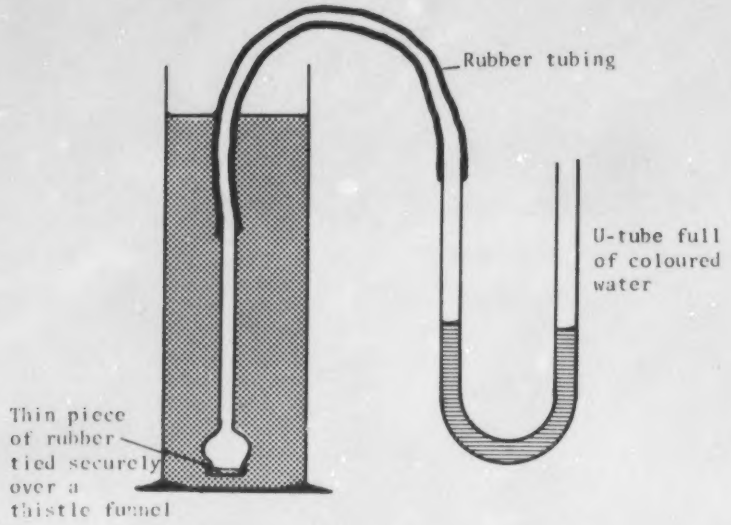
A rubber ball with a hole in it does not bounce very high because, with a hole in the ball

A. the rubber loses its elasticity.
B. air can enter the ball and increase the pressure inside it.
C. air can escape from the ball rather than be compressed.
D. there is less rubber in the ball and so it is less elastic.

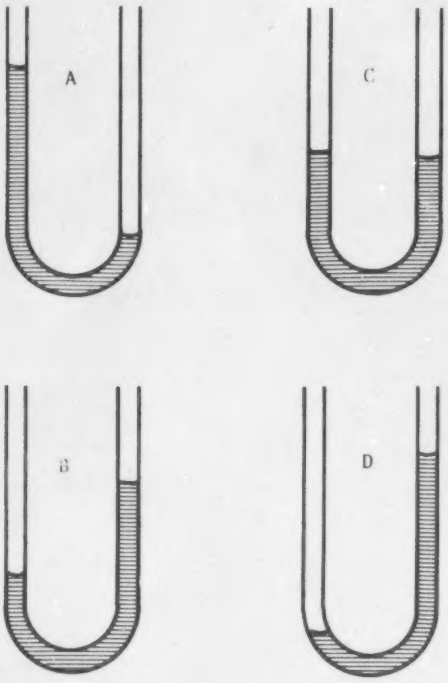
C4

442

The next question refers to the following diagram.



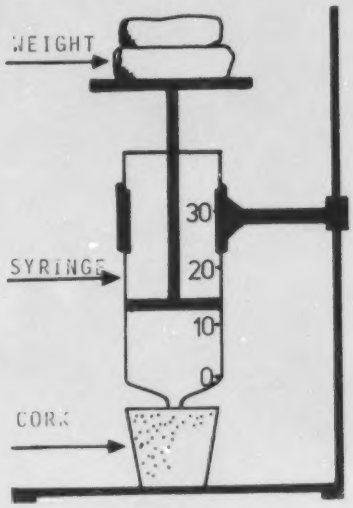
If the thistle funnel were removed from the measuring cylinder of water then the level of coloured water in the U-tube would be correctly shown by



The next question refers to the diagram and information below.

A gas was enclosed in a syringe as shown and weights put on top. A student obtained the following results:

Number of Weights	Volume of Gas in syringe (mls)
1	21
2	20
3	18
4	17
5	14
6	2



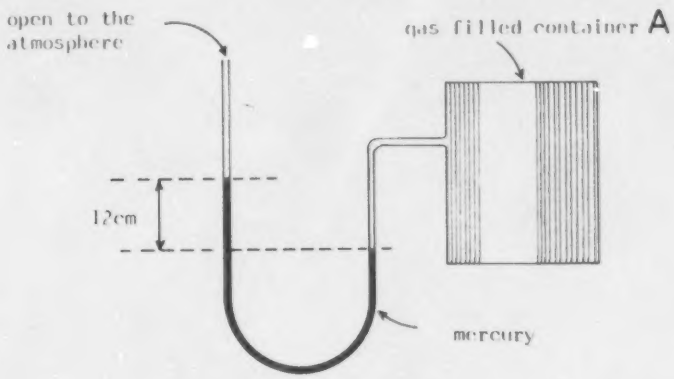
The last result appears wrong. When writing his report of the experiment, the student should

A. report all results, noting that the last result is unexpected.
B. leave out the last result as it spoils the experiment.
C. ignore the last result, using other results as a guide to what the volume should be.

A5 D. ask others what results they got and then change the last result.

444

The manometer shown below contains mercury and has been set up to measure the pressure of the gas in the container A.



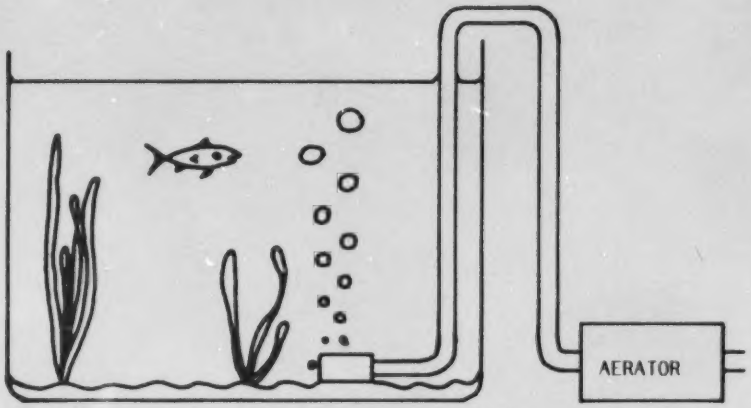
The reading on the manometer is shown in the diagram. Assuming that atmospheric pressure is 76cm of mercury, what is the true pressure of the gas in the container?

A. 12cm of mercury.
B. 88cm of mercury.
C. 64cm of mercury.

B1 D. 100cm of mercury.

445

An aerator which pumps air into a fish tank releases air bubbles at the bottom of the tank.

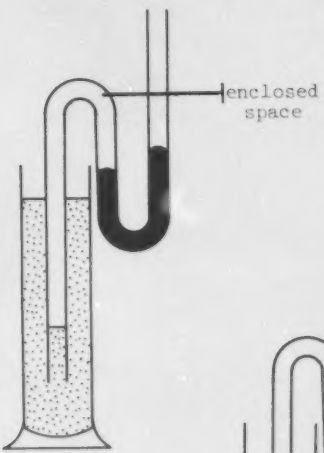


As the bubbles rise they expand. This expansion is caused by the

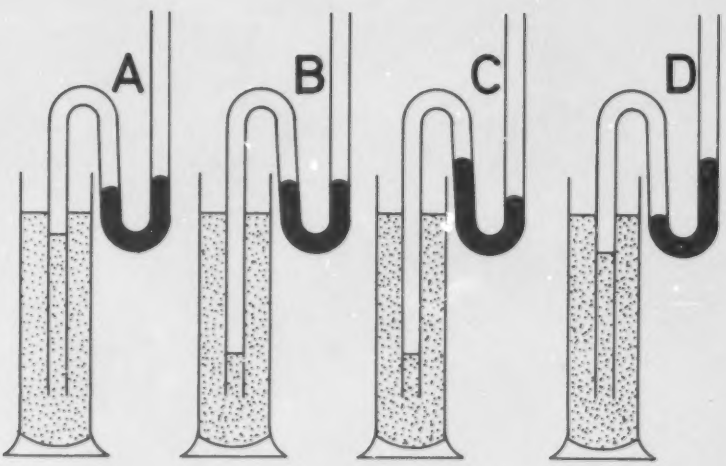
A. water pressure on the bubbles decreasing as the bubbles rise.
B. bubbles gathering air dissolved in water.
C. temperature of the water in the tank being higher at the top than at the bottom.
D. plants in the tank producing oxygen.

A3

446



Some air was drawn out of the enclosed space in the apparatus drawn on the left. Which diagram below best shows the result of doing this?



A2

447

It has been suggested that in an emergency a well-shaken can of fizzy drink could be used as a fire extinguisher. If you were in such an emergency and had a range of cans available, it would be best to use a can which is

A. already open.
B. warm.
C. frozen.
D. chilled.

B3. 448

A partially inflated balloon is seen to inflate more as it is taken up a very high mountain. This is most probably because

A. air particles diffuse through and collect in the balloon.
B. air particles diffuse out of the balloon.
C. air pressure outside the balloon becomes noticeably less.
D. air pressure outside the balloon becomes noticeably greater.

C3. 449

MOVING BODIES

The next three questions refer to the following information.

The table below gives the velocities in metres per second of bodies P, Q, R, S and T at times 0, 1, 2 and 3 seconds.

time \ body	P	Q	R	S	T
0 s	2	12	10	0	4
1 s	4	9	20	5	4
2 s	6	6	30	20	4
3 s	8	3	40	45	4

Which one of the following bodies has no net force acting on it?

A. P.
B. R.
C. S.
D. T.

D.2 450

On which one of the following bodies is the net force acting in a direction opposite to its motion?

A. P.
B. Q.
C. R.
D. S.

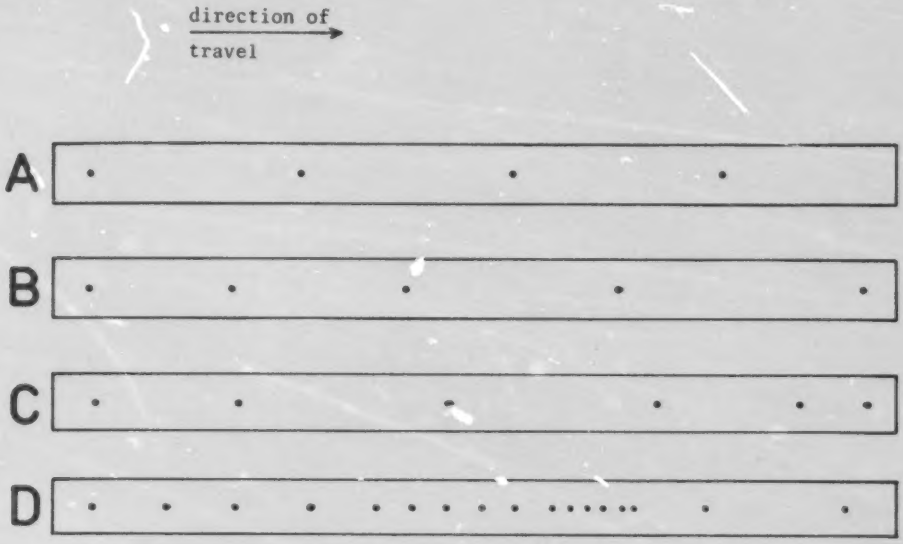
B.3 451

What is the magnitude of the average acceleration of body Q during the first three seconds that were recorded?

A. 1.5 m/s^{-2}
B. 3.0 m/s^{-2}
C. 4.5 m/s^{-2}
D. 6.0 m/s^{-2}

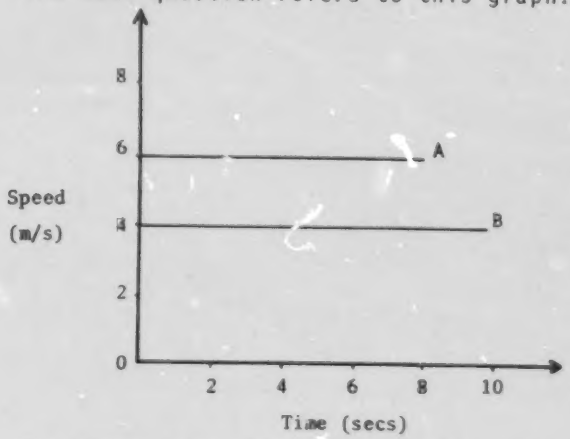
B.3 452

The diagrams below show the motion of four different cars in an experiment using "ticker-timers". If each car slowed down at the same rate which would stop first?



C2. 453

The next question refers to this graph.



The graph shows the speeds of two objects A and B for a certain period of time. From the graph we know that

A. B has travelled further than A.
B. both objects are standing still.
C. A stops two seconds before B.
D. A is moving faster than B.

D.1 454

A stick is thrown into a running stream and the time measured for its travel of 10 metres on 5 separate occasions. The times obtained were:

1 minute 40 seconds, 2 minutes 10 seconds, 1 minute 10 seconds, 1 minute 20 seconds, exactly 2 minutes.

The average speed of the stick in the stream is nearest to

A. 100 metres per second.
B. 0.1 metres per second.
C. 1 metre per second.
D. 10 metres per 10 seconds.

B.2 455

Assume you are in a car travelling at 45 kilometres per hour (kph) and are passed on the same road by a car travelling at 60 kilometres per hour. At what speed would the other car be travelling, relative to your car, if it was passing your car in the opposite direction?

A. 15kph B. 45kph C. 50kph D. 105kph

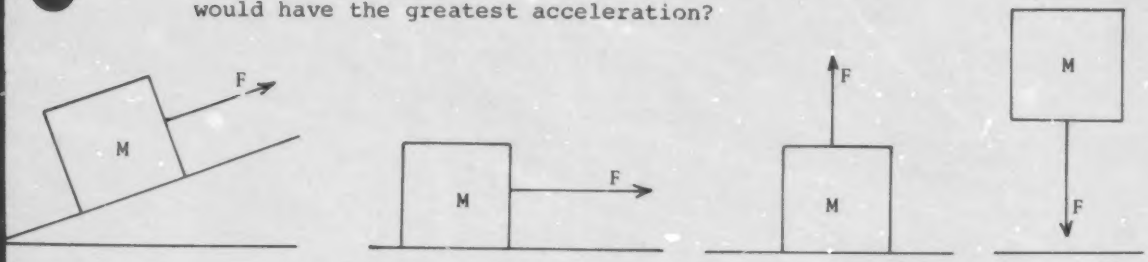
D.2 456

Assume you are in a car travelling at 45 kilometres per hour (kph) and are passed on the same road by a car travelling at 60 kilometres per hour. At what speed would the other car be travelling, relative to your car, if it was passing your car in the same direction?

A. 15kph B. 45kph C. 60kph D. 105kph.

A.2 457

Each of the objects shown below has identical mass. If identical forces acted on each of the objects, which would have the greatest acceleration? 458



D4. 653

Galileo showed that if a large object and a small object are dropped together they both reach the ground at the same time. If we were to drop two different objects on the Moon where the gravitational pull is much less than that on Earth, then we would expect

A. the large object to fall faster than the small object but slower than it would fall on Earth.
B. the small object to fall faster than the large object but slower than it would fall on Earth.
C. both objects would reach the lunar surface together but would have fallen more slowly than on Earth.
D. both objects would reach the lunar surface together but would have fallen with the same speed as on Earth.

C.3 459

Newton's 3rd law of motion explains that:
"For every force there is an equal and opposite force".

Which of the following situations illustrates this law?

A. A stone falling from a tall building.
B. An unsealed inflated balloon, when released, flies through the air.
C. The tendency of a moving object to keep moving.
D. A ball rolling down a slope.

B.2 460

The unit used in physics to measure work is the

A. joule.
B. Newton.
C. volt.
D. watt.

A2 461

Which unit is the same as a Newton?

A. $kg.m.s^{-3}$
B. $kg.m.s^{-1}$
C. $kg.m^{2}.s^{-2}$
D. $kg.m.s^{-2}$

D1 462

Which two quantities below have the same units of measure?

A. Kinetic energy and power.
B. Momentum and Kinetic energy.
C. Force and power.
D. Work and potential energy.

D1 463

For which quantity is the unit of measure a $kg.m.s^{-1}$

A. Force.
B. Power.
C. Momentum.
D. Energy.

C1 464

The quantity Impulse, in physics, is represented by the equation $I = Ft$ where F is force and t time.
Impulse has the same units as which other physical quantity?

A. $F = ma$.
B. $M = mv$.
C. $P.E = mgh$.
D. $K.E = \frac{1}{2}mv^{2}$.

B1 465

The Newton-metre is the same as the

A. joule.
B. Watt.
C. $kg.m.s^{-3}$
D. $kg.m.s^{-1}$

A1 466

Which quantity and unit are correctly matched?

A. Work, Newton.
B. Power, watt.
C. Velocity, $m.s^{-2}$
D. Acceleration, $kg.m.s^{-1}$

B1 467

The quantity X in physics, represented by the equation

$X = \text{mass} \times \text{acceleration} \times \text{displacement}$,

would have which units?

A. $kg.m.s^{-2}$
B. Newton.
C. $kg^{2}.m.s^{-2}$
D. watt.

C1 468

Which equation in physics which enables the power to an engine to be found?

A. $p = W \times t$
B. $p = \frac{W}{t}$
C. $P = mph$.
D. $P = Fs$.

B1 469

Which is the correct unit for weight?

A. Gram.
B. Kilogram.
C. Newton.
D. Tonne.

C1 470

A car travelling at a constant speed of 60 kilometres per hour passes the corner of a street which is 300 metres from a pedestrian crossing just as a woman steps on to the crossing. How long does she have to cross the road before the car reaches the crossing? 47.

A. 5 minutes B. 3 minutes C. 50 seconds D. 18 seconds.

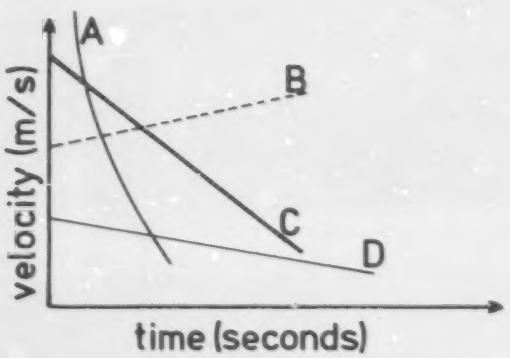
D2.

A sports car has half the mass of a family saloon car but both have motors which can exert the same force. If the drivers exert both motors to the fullest from a rest start then

A. the saloon should accelerate faster because it has a greater mass.
B. the sports car should accelerate faster because it has a smaller mass.
C. both cars will accelerate at the same rate because they are experiencing the same force.
D. the car with the better driver will accelerate faster.

B.3 472

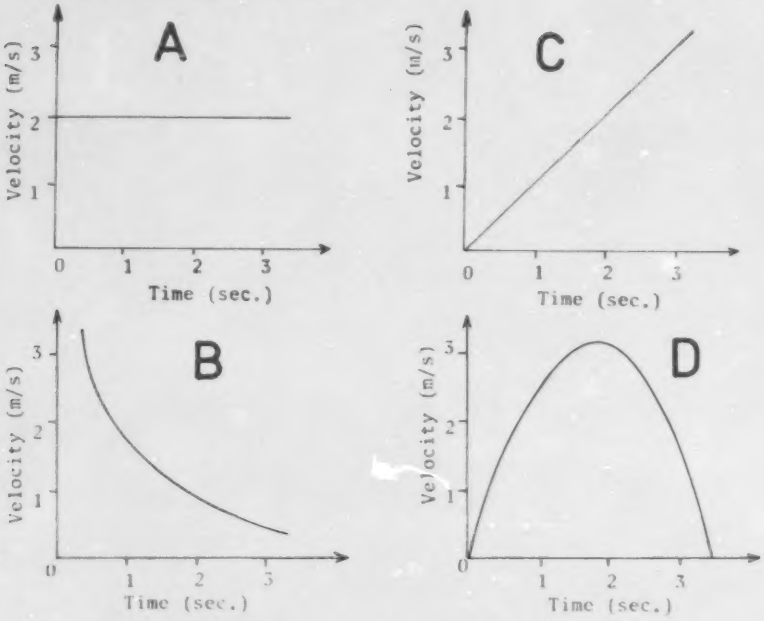
This graph shows the velocity of four cars plotted against time.



Which car is slowing down at the greatest rate?

A3. 473

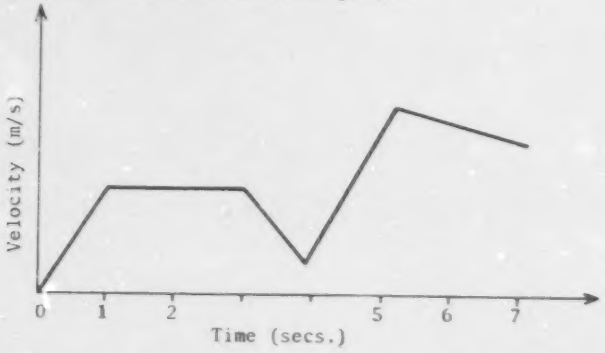
The graphs below show the motion of four objects of equal mass plotted against time.



Which object has the greatest kinetic energy at time 2 seconds?

D4. 474

The next question refers to this graph.



The graph shows the velocity of a car plotted against time for a short part of its journey.

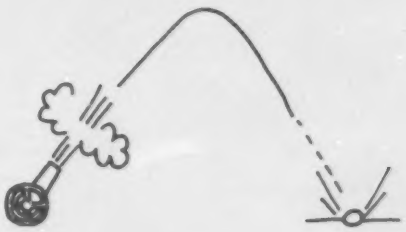
During which period of time was the car travelling with constant velocity? Between

A. 0 and 1 second.
B. 1 and 3 seconds.
C. 3 and 4 seconds.
D. 5 and 7 seconds.

B4. 475

What happens to the speed of the cannon ball fired through the air as shown in the diagram on the right?

A. It increases.
B. It decreases.
C. It increases then decreases.
D. It decreases then increases.



D1

476

In which one of the following pairs of quantities do the members of the pair have the same dimensions?

A. Work and energy.
B. Force and power.
C. Mass and weight.
D. Length and area.

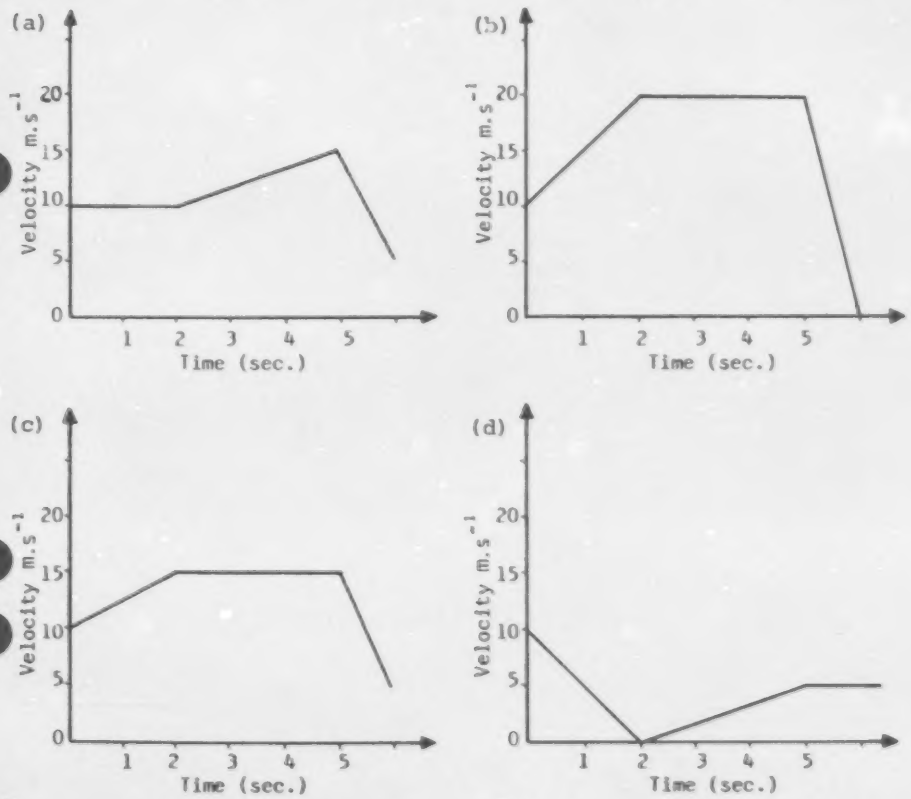
A1

477

The next question refers to this statement:

"An object starts at $10 m.s^{-1}$ and accelerates for 2 seconds. It then travels at a constant velocity for another 3 seconds, then slows down to $5 m.s^{-1}$."

Which graph below shows what is described by the statement?



C3

478

The next 9 questions refer to the following information.

A mass of 6 kg is at rest on a smooth horizontal surface. A force of 24 N is applied to the body for 3 seconds and then removed.

The acceleration produced by the force will be nearest

B3 A. 2 $m.s^{-2}$ B. 4 $m.s^{-2}$ C. 8 $m.s^{-2}$ D. 9 $m.s^{-2}$ 479

After 3 seconds, the velocity of the body, in $m.s^{-1}$, will be

C3 A. 6 B. 8 C. 12 D. 24 480

The average velocity of the body during these three seconds, in $m.s^{-1}$, will be

C1 A. 3 B. 4 C. 6 D. 8 481

In the three seconds, the body will travel

C1 A. 9m. B. 12m. C. 18m. D. 27m. 482

What will be the momentum of the body after 3 seconds?

A. 24 $kg.m.s^{-1}$ C. 48 $kg.m.s^{-1}$
D2 B. 36 $kg.m.s^{-1}$ D. 72 $kg.m.s^{-1}$ 483

After 3 seconds, the kinetic energy of the body will be, in joules,

C2 A. 108 B. 206 C. 432 D. 864 484

In the absence of friction and air resistance, what would be the velocity of the body after 5 seconds?

D3 A. 12 $m.s^{-1}$ B. 15 $m.s^{-1}$ C. 18 $m.s^{-1}$ D. 20 $m.s^{-1}$ 485

What force would have to be applied to the body in order to stop it in the next 4 metres of travel?

D1 A. 108 N B. 194 N C. 243 N D. 300 N 486

How much work would have to be done to stop the body after 5 seconds?

A. 432 joules. C. 972 joules.
A1 B. 775 joules. D. 1200 joules. 487

What quantity in physics is represented by X in the equation

$$X = m \times v ?$$

A. kinetic energy. C. power.
C3 B. momentum. D. work. 488

The next 7 questions refer to the information below.

A stone of mass 5 kg is held over the edge of a cliff and dropped. The cliff is 10 metres high, and the acceleration due to gravity at that spot is 10 m/s^2.

What is the potential energy possessed by the stone?

A. 50 J
B. 100 J
C. 500 J
D. 1 000 J

C3 489

How much potential energy would the stone have after it had fallen half-way down the cliff?

A. 0 J
B. 50 J
C. 250 J
D. 500 J

C3 490

The kinetic energy of the stone on reaching the ground would be

A. 100 J
B. 250 J
C. 500 J
D. 1 000 J

C2 491

How long would it take for the stone to reach the bottom of the cliff?

A. 1 sec.
B. $\sqrt{2}$ sec.
C. $\sqrt{3}$ sec.
D. 2 sec.

B1 492

What would be the velocity of the stone on hitting the ground?

A. 10 $m.s^{-1}$
B. 14 $m.s^{-1}$
C. 20 $m.s^{-1}$
D. 25 $m.s^{-1}$

B1 493

The momentum of the stone on reaching the ground would be nearest to

A. 50 $kg.m.s^{-1}$
B. 70 $kg.m.s^{-1}$
C. 100 $kg.m.s^{-1}$
D. 150 $kg.m.s^{-1}$

B1 494

How long would it take for a 10 kg stone to fall from the same cliff to its base?

A. The same time as the 5 kg stone.
B. Twice as long as the 5 kg stone.
C. Half as long as the 5 kg stone.
D. Just slightly longer than the 5 kg stone.

A3 495

A big boy and a small boy are both standing on ice. Both are wearing skates. The small boy gives the big boy a hard push from behind. As a result

A. both boys move away from each other with equal speed.
B. both boys move away from each other, the smaller boy faster.
C. both boys move away from each other, the larger boy faster.
D. the larger boy moves forward but the smaller boy remains behind.

B3 496

If a motor truck is accelerating along a level road, then

A. its velocity is increasing, its momentum is increasing, but its kinetic energy is decreasing.
B. its kinetic energy is decreasing, but its momentum is increasing. Velocity is also decreasing.
C. kinetic energy, momentum and velocity are all increasing.
D. kinetic energy and momentum are both increasing, but velocity is decreasing.

C3 497

What is the momentum of an object which has a mass of 6kg and is moving with a velocity of 10m/s?

A. $60\ kg.m.s^{-1}$ C. $300\ kg.m^{2}.s^{-1}$
B. $180\ kg^{2}m.s^{-1}$ D. $3600\ kg.m.s^{-1}$

A5 498

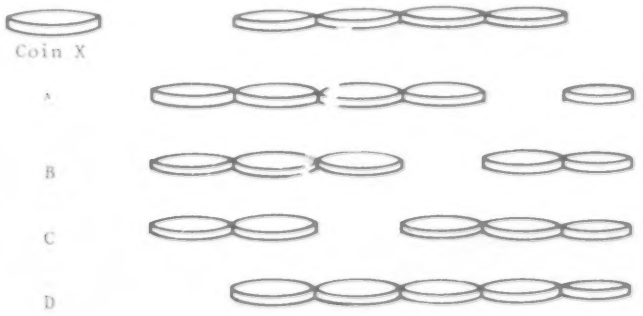
An object has a momentum of 100kg m/s and a mass of 20kg. It velocity would be

A5 A. $5\ m.s^{-1}$ B. $10\ m.s^{-1}$ C. $15\ m.s^{-1}$ D. $20\ m.s^{-1}$ 499

If a body of mass 10kg has a momentum of 200kg m/s, then it will be moving with a velocity, in m/s, of

05 A. 2 B. $\sqrt{20}$ C. $\sqrt{40}$ D. 20. 500

Which of the diagrams below shows what happens when coin X is flicked onto the end coin of the line of coins shown?



A3 501

To find an explanation for the way a rocket ship works, you would refer to the work of

A. Newton.
B. Einstein.
C. Faraday.
D. Rutherford.

A3

502

When the speed of a car is doubled, its kinetic energy

A. is halved.
B. remains the same.
C. is doubled.
D. is four times greater.

D1

503

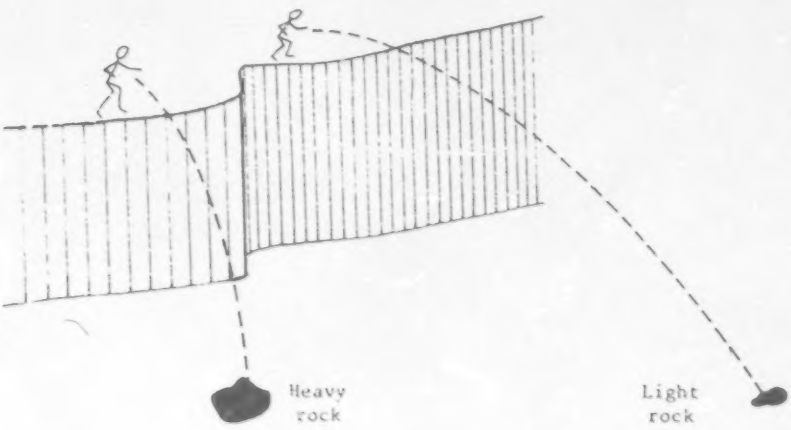
The acceleration of objects which are dropped and fall towards the earth is

A. determined by their mass.
B. always the same.
C. determined by their volume.
D. the same if dropped from the same height.

D1

504

The next question refers to the following diagram.



Two men on the top of a cliff throw a heavy rock and a light rock straight out horizontally. Concerning the *kinetic energies* of the rocks when they land, the correct statement is

A. the heavy rock lands with the most energy.
B. the light rock lands with the most energy.
C. they both land with the same amount of energy.
D. you cannot tell because you do not know how hard they were thrown.

D1

505

The work, measured in joules, required to change the potential energy of an object from 10 joules to 20 joules in four seconds is

B1 A. 2.5 B. 10 C. 40 D. 200. 506

Consider a brick dropped vertically from the top of a tall building. Compared with when it reaches the ground, when it is halfway down it has

A. half the velocity.
C. half the kinetic energy.
C1 B. half the acceleration.
D. fallen for half the time. 507

In uniform circular motion the

A. speed is constantly changing.
B. acceleration is constant in magnitude and direction.
C. velocity is constant in magnitude and direction.
D2 D. tangential speed is constant. 508

The equation which correctly describes the momentum possessed by a body of mass m kg moving with velocity v m/s is

A. $M = \frac{1}{2}mv^2$
C. $M = m + vt$
D3 B. $M = mv^2$
D. $M = mv$ 509

A stone is allowed to fall freely from rest. If the acceleration due to gravity is 9.8 m/s^2, the distance the stone would fall in the first second is

A. 4.9 metres.
C. 19.6 metres.
A1 B. 9.8 metres.
D. 24.5 metres. 510

A boy pushes two boxes with identical force. One of the boxes accelerates more than the other. In what fundamental property do they differ?

A. Density.
C. Size.
B4 B. Mass.
D. Volume. 511

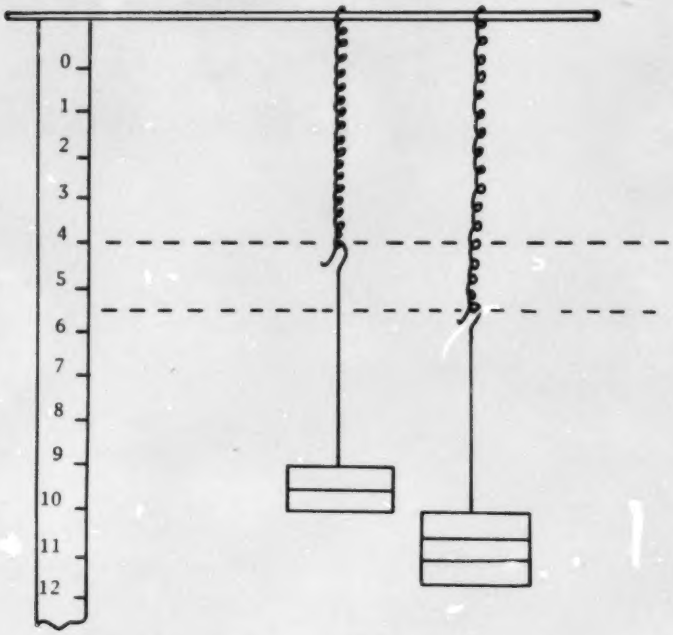
When the speed of a moving body is doubled its

A. acceleration is doubled.
B. potential energy is doubled.
C. kinetic energy is doubled.
D1 D. momentum is doubled. 512

Two cars are moving along a road. The mass of one car is twice that of the other, but it is moving at half the speed of the other.
The ratio of the kinetic energy of the larger car to that of the lighter car is

B1 A. 1:1 B. 1 : 2 C. 1 : 4 D. 2 : 1 513

The apparatus shown below consists of two identical springs carrying different weights alongside a measuring scale. (Both springs shown will return to normal when weights are removed).



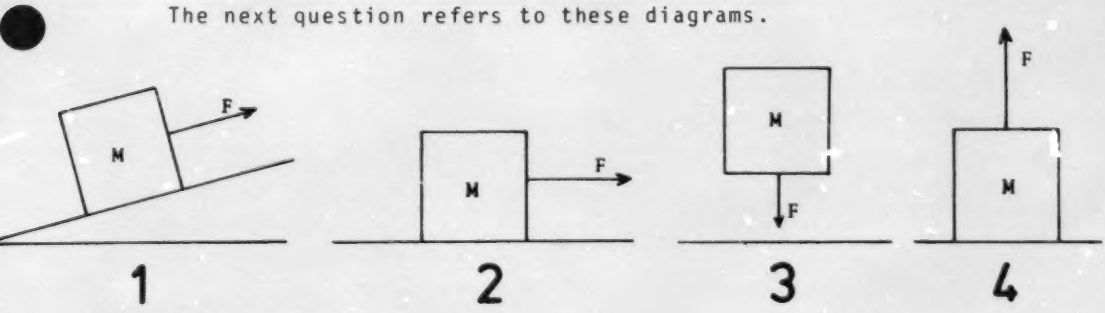
From the information in the diagram, the best estimates of the length of the spring (carrying no weights) is

A. 1 unit.
B. 1½ units.
C. 2 units.
D. 3 units.

A2

514

The next question refers to these diagrams.



Which statement concerning the objects drawn is correct?

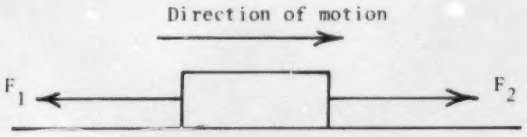
A. All objects will accelerate at the same rate
B. Objects 1, 2 and 3 will accelerate, but object 4 will remain stationary.
C. Object 3 will accelerate, objects 1, 2 and 4 might accelerate.
D. Objects 2 and 3 will accelerate, 1 and 4 will move with constant velocity.

C3.

515

The next two questions refer to the following information.

The diagram below represents a body moving along a horizontal surface with only two forces affecting its motion, shown as F_1 and F_2.



If the body is slowing down then which one of the following statements is correct?

A. F_1 is greater than F_2.
B. F_1 is less than F_2.
C. F_1 is equal to F_2.

A1 D. the relationship of F_1 to F_2 cannot be determined. 516

If the body is moving with constant velocity then

A. F_1 is greater than F_2.
B. F_1 is less than F_2.
C. F_1 is equal to F_2.

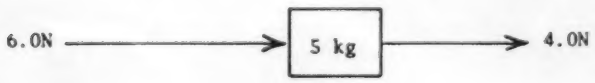
C1 D. the relationship of F_1 to F_2 cannot be determined. 517

If the velocity of a car is halved, then its momentum is

A. doubled. C. halved.

C2 B. quadrupled. D. quartered. 518

A pushing force of 6.0 newtons and a pulling force of 4.0 newtons act simultaneously on a body of mass 5.0 kg, as shown in the diagram.



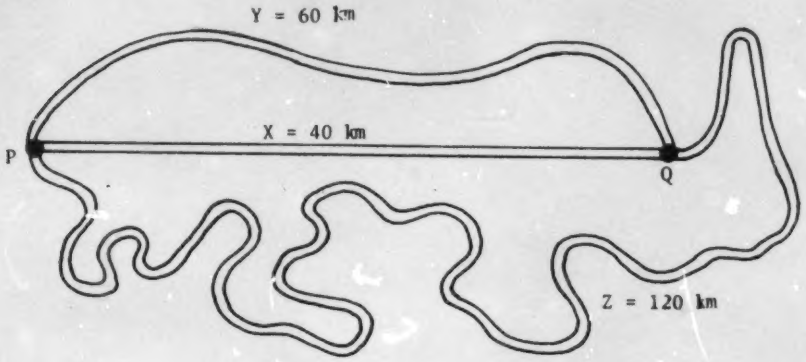
The magnitude of the acceleration of the body is (in $m.s^{-2}$)

A. $5(6 + 4)$ C. $\frac{5}{6 + 4}$

B2 B. $\frac{6 + 4}{5}$ D. $5(6 - 4)$ 519

The next 8 questions refer to the information below.

Consider 3 cars, X, Y and Z, travelling from P to Q via the roads drawn. The times for each journey are given.



Time for X to travel 40 km = 1 hour
Y to travel 60 km = 1.5 hours
Z to travel 120 km = 2 hours

The average speed of car Y was

B3 A. 30 km/hr. B. 40 km/hr. C. 60 km/hr. D. 90 km/hr. 520

The average speed, in metres per second, of Car X is nearest

A1 A. 11 B. 16 C. 27 D. 40 521

Which statement is correct?

A. The displacement of car X at Q is least.
B. At Q, Y has been displaced 60 km.
C. Displacement of car Z at Q, is greater than that of car Y, which is greater than that of car X.
D1 D. Displacement of all cars at Q is equal. 522

How long would it take car Y to travel 100 km?

C3 A. 1.75 hrs. B. 2 hrs. C. 2.5 hrs. D. 3 hrs. 523

The driver of car X wished to return from Q to P at a speed which meant that his total time of travel (from P to Q and back) was 1.5 hours.
At what speed would he have to travel from Q to P to achieve this?

D2 A. 20 km/hr B. 40km/hr. C. 60 km/hr. D. 80 km/hr. 524

525

At what speed would car Y have to travel from Q to P so as to average 60 km/hr for the total journey from P to Q and back?

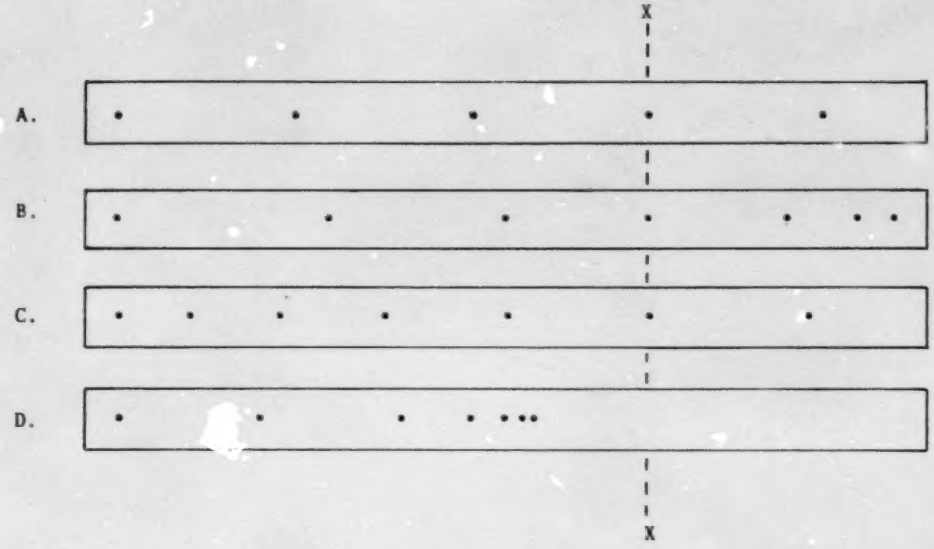
C3 A. 30 km/hr. B. 60 km/hr. C. 120 km/hr. D. 240 km/hr.

If car Z took 1 hour to travel from Q back to P along route Y what would be its average speed for the total trip P to Q and back?

A1 A. 60 km/hr. B. 80 km/hr. C. 100 km/hr. D. 120 km/hr.

526

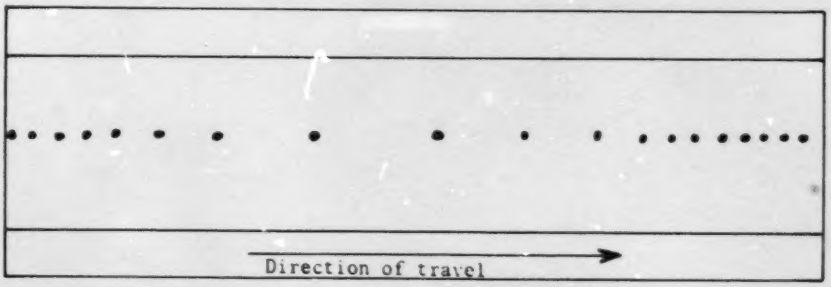
The diagrams show oil drops on a road which were left by four different cars. If the oil in each car dripped at the same constant rate, and all cars were travelling from left to right, which car was travelling fastest at the instant marked 'X'?



A3.

527

A car with a leaky radiator loses a drop of water at regular time intervals. Along a straight stretch of road the pattern of splashes appears as shown in the diagram.



The pattern indicates that, on the stretch of road, the car

A. is moving with a constant acceleration throughout.
B. is moving with a constant velocity throughout.
C. must have stopped and started several times.
D. speeded up then slowed down.

D.5

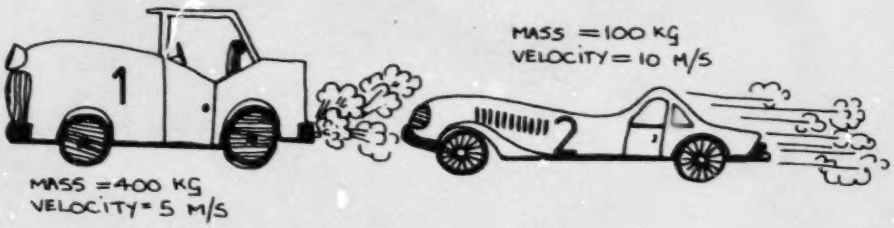
528

The equation in Physics which enables us to calculate the kinetic energy of an object is:

$$\text{Kinetic Energy} = \tfrac{1}{2} m v^2$$

where m = mass of object in Kg.
v = velocity of object in m/s.

Consider the following cars moving along a road with masses and velocities as shown.



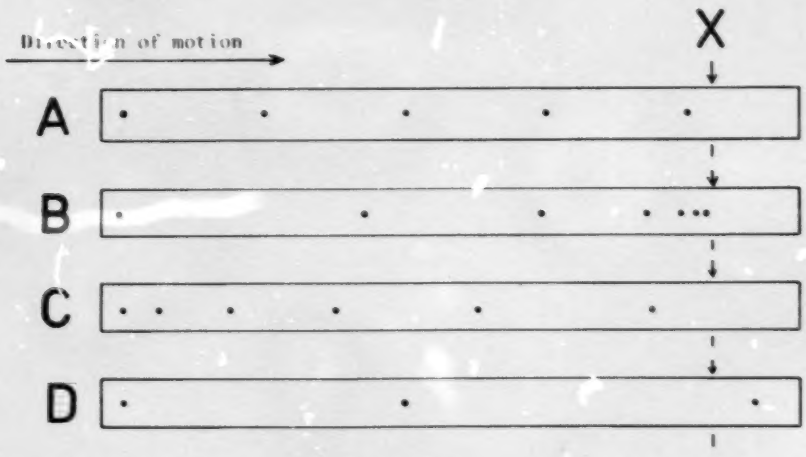
It is true to say that the kinetic energy of car 1 is

A. equal to that of car 2.
B. half that of car 2.
C. twice that of car 2.
D. four times that of car 2.

A.1

529

The diagrams below show the motion of four objects, each with the same mass, as recorded on tape during a "ticker-tape" experiment.



Which object would have the most kinetic energy at the instant shown by "X"?

D1.

530

RADIOACTIVITY

Atoms of an element that decay by α emisson become atoms of a different element. What is the relationship between the atomic number of the original element Z_o, and the atomic number of the new element, Z_n?

A. $Z_o > Z_n$
B. $Z_o < Z_n$
C. $Z_o = Z_n$
D. There is no relationship.

A1

531

A certain radio-active material has a mass of 0.2 grams, and has a half-life of 3 years. There will be

A. none remaining after 6 years.
B. 0.025g remaining after 9 years.
C. 0.05g remaining after 3 years.
D. 0.1g remaining after 1½ years.

B3

532

The time taken for half the atoms in a radioactive sample of uranium to decay is called the half-life and is 4,500 million years.

Scientists use this information to

A. predict the ages of some rocks.
B. build better nuclear reactors.
C. determine the age of trees.
D. make bigger atomic weapons.

A.3

533

Humans working in the presence of the products of radioactive decay must be shielded since the products are dangerous to health. From which of the following radioactive decay products do humans require the most shielding?

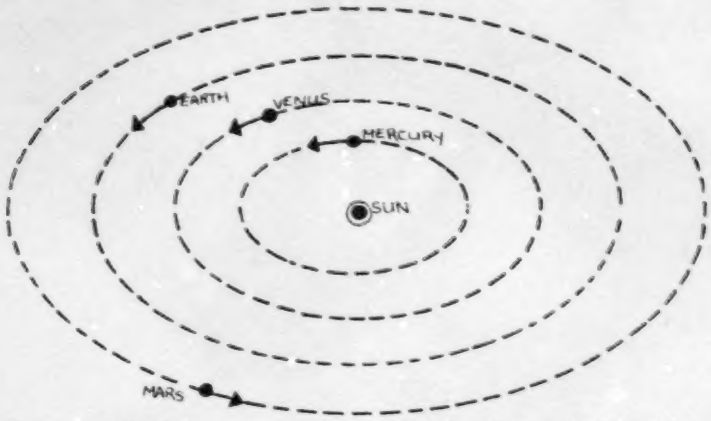
A. α (alpha) particles.
B. β- (beta minus) particles.
C. β+ (beta plus) particles.
D. γ (gamma) rays.

D.3.

534

ASTRONOMY

The next question refers to this diagram of part of the Solar System. The diagram is NOT to scale.



If you wished to see Venus early in the morning, from the diagram, you can say that you should look in the

A. eastern sky.
B. western sky.
C. northern sky.
D. southern sky.

A3. 535

Life on earth is influenced by the movement of other objects in the Universe. The most obvious example of this is the effect of the movement of

A. the sun on the weather.
B. the moon on the tides.
C. the sun on plant growth.
D. the planets on the seasons.

B1. 536

Shadows are much "deeper" (darker) on the Moon than on the Earth.
This is because

A. there is no atmosphere on the Moon.
B. less light falls on the Moon.
C. the Moon is closer to the Sun.
D. Earth receives light from both Sun and Moon.

A1. 537

Consider an astronaut in space making repairs to his spaceship. Which of the following tools would be easiest to use without special precautions?

A. Hammer.
B. Pliers.
C. Saw.
D. Screwdriver.

538

B2.

Which one of the following changes in the universe happened most recently?

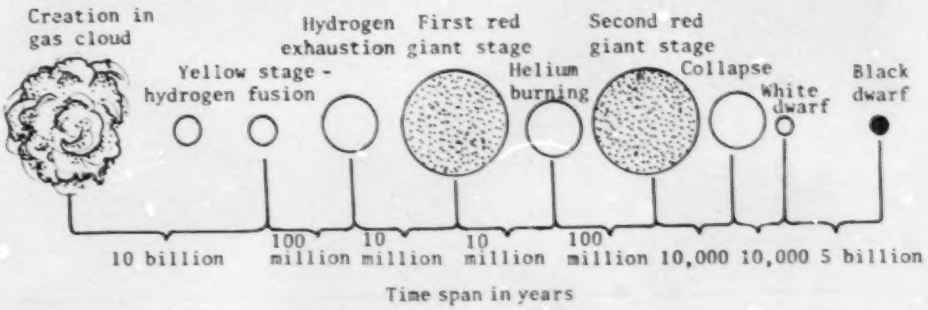
A. The formation of our galaxy.
B. The "big bang".
C. The formation of Mars.
D. The birth of our sun.

539

C2.

The next two questions refer to this diagram. It shows one theory of how stars like our sun are formed and destroyed.

Evolution of a Sun-Size Star



If the theory is correct, about how long has our sun probably existed?

A. 5 billion years.
B. 10 billion years.
C. 10 billion + 100 million years.
D. 10 billion + 110 million years.

540

B1.

Betelgeuse, in the constellation 'Orion' is known as a "red giant". Its age must be about

A. 10 billion + 110 million years.
B. 10 billion + 220 million years.
C. either (A) or (B).
D. none of the above.

541

C1.

When the Viking I probe landed on Mars the probe found the atmosphere contained 4 per cent nitrogen and water vapour. For any life, as we know it, to exist on Mars there would also have to be evidence of

A. oxygen or oxides.
B. ammonia or ammonium salts.
C. carbon compounds or carbon dioxide.
D. hydrogen or hydrides.

C1. 542

"Peering into the heavens is like looking back into time, and some of the stars which astronomers see may no longer exist." This statement is probably true because

A. light travels slowly from distant stars.
B. during the time the light travels, the stars change.
C. "dead" stars still give some light.
D. we cannot clearly detect the light from distant stars.

B2. 543

"The Universe never really changes - it just goes round and round, in a series of different cycles."

Which of the following observations does NOT support this statement?

A. Sometimes new stars appear in the sky.
B. Summer days, on earth, are longer than winter days.
C. Some planets take longer than the earth to circle the sun.
D. Sometimes comets pass close to the earth.

A2. 544

On July 20, 1976 Viking 1 landed on Mars.
"Even before the biologists had begun their tests, Viking 1 had shown that, as Dr. McElroy put it: 'the elements of the chemistry set are there. We have water, we have carbon, we have nitrogen, we have sunlight. The only real remaining question is whether the Great Chemist was there putting the elements together in the right way.'
On that summery day, the air temperature ranged from -86°C shortly after dawn to a mid afternoon high of -31°C."

On Earth which of the following organisms would be most likely to be able to survive these conditions?

A. Marine plankton.
B. Man-like mammals.
C. Bacterial micro-organisms.
D. Algae.

C3. 545

A telescope mounted in a satellite orbiting Earth should obtain a clear view of the stars because

A. the sun would not be shining directly on it.
B. the atmosphere would not disturb the starlight.
C. dust would not collect on the mirror.
D. the mirror would not bend due to weightless conditions.

B2. 546

Astronomers have spent many years studying the changes in the objects seen in the sky. They have found that some of these changes follow a regular, predictable pattern, and some do not seem to follow any pattern.

One of these events which does not seem to follow a pattern, and which cannot be predicted by astronomers, is

A. a meteor blazing through the atmosphere.
B. the moon moving into the earth's shadow.
C. a planet disappearing from view behind the moon.
D. the moon passing between the earth and the sun.

A4. 547

During the Apollo missions to the moon, it was important to maintain continuous communication with the astronauts. To do this, communication centres were established in Australia, Europe and North America. These locations were chosen largely because

A. they were widely separated.
B. at least one of the three centres could maintain direct line of sight with the rocket.
C. each of the communication centres was in a technically advanced country.
D. a full moon would be visible from at least one of the centres at all times.

B3. 548

The next two questions refer to this article:

MARINER THROWS FIRST LIGHT ON MERCURY'S ORIGIN

Mariner 10 has just completed the most productive interplanetary exploration ever accomplished.

Last weekend the American space probe made an unprecedented third pass at Mercury, the scorched pockmarked planet nearest the sun.

Gliding through space at close to 25,000 miles an hour the 1,000-pound (454kg) craft went the closest any man-made space vehicle has come to another planet since the Soviet Union crash-landed a satellite on Venus in the late 1960's.

A year ago virtually nothing was known about the face of Mercury, but after these three photographic sessions there are now excellent pictures of the planet's surface available to earth scientists.

Details of the planet's surface as small as 150 yards was clearly visible because, according to scientists, Mercury's surface is five times brighter than the surface of the earth on the brightest day at high noon.

A laboratory spokesman said after the first batch of pictures arrived back on earth:

"Mercury looks like the moon, although it's somewhat different. The pictures show cratering, wells, rocks and ridges on the surface. They are very sharp."

Space scientists were also very excited by the analysis of information relayed back about Mercury's magnetic field.

The findings indicate that Mercury's magnetism is caused by a mechanism similar to that of earth. Dr. Ness, however, said the surface strength of the Mercurian field might be only 800 or 900 gammas, compared with the reading of 30,000 gammas at earth's equator.

"Sun-Herald" Sunday 23rd March, 1975

The most likely reason that Mercury's surface is "five times brighter than the surface of the Earth on the brightest day at high noon" is :

A. dust and pollution in the earth's atmosphere reduces the sunlight's strength.
B. Mercury is much closer to the Sun than Earth is.
C. Mercury's rocks and soil are a much paler colour than the Earth's.
D. Mercury gives off some light of its own because it is very hot.

This question refers to the article on the previous page.

The information about Mercury's magnetic field suggests that the planet Mercury may have a

A. stronger gravitational field than the Earth.
B. weaker gravitational field than the Moon.
C. similar surface to the Moon.
D. similar interior to the Earth.

D.2 550

Of the following true statements, three can rest on the student's own observations, and one must be accepted on some other authority.

Which statement must be based on some "other authority"?

A. Light from the sun consists of many colours.
B. The sun is approximately one hundred and fifty million kilometres from earth.
C. The sun radiates heat and light energy.
D. The shadow cast by the sun is shortest at noon.

B3. 551

Books about astronomy often tell you how far it is from the earth to other objects in the sky. Some distances are not given because they keep on changing and so there would be no point in putting them in.
Of the following, the distance which keeps changing so much that it is not usually included in books is the distance from earth to

A. the moon.
B. the sun.
C. the planet, Venus.
D. the star, α-Centauri.

C1. 552

Astronomers use the light year as a unit of distance.
The light year is the distance travelled by light in one year (taken as 365 days).
The speed of light is 300 000 000 metres per second.

It has been suggested that distances on earth could be measured with this unit.

Approximately how many metres are there in a light second?

A. 300 000 000 x 365 x 24 x 60
B. 300 000 000 x 365 x 24
C. 300 000 000 x 365
D. 300 000 000

D1. 553

Space scientists expect that man will travel to other planets in the solar system during the next 100 years.
However, they do not think we will travel to planets of other suns in the universe in the next 100 years.
The main reason that trips to planets of other suns are unlikely, is that we

A. don't know in what direction to go to find other planets.
B. fear that the planets will have strange life forms which would kill the spacemen.
C. doubt that there are any other stars which have planets.
D. realize that such trips would take too long because the distances are so great.

D5. 554

When astronauts visited the moon any dust they kicked up settled much faster than dust kicked up on earth. The *best* reason for this is that the

A. dust grains on the moon are much larger than the dust grains on earth.
B. moon has no atmosphere to slow the settling of the dust.
C. gravitational pull of the moon is much weaker than the gravitational pull of the earth.
D. astronauts can kick harder on the moon because of the weaker gravitational pull.

555

B3.

A camera is mounted on a tripod and pointed to one spot in the sky. Without moving the camera three photographs of the stars are taken an hour apart.

9.00 p.m. 10.00 p.m. 11.00 p.m.

The best explanation for these different photographs is that the

A. stars rotate about the universe.
B. pattern of stars is constantly changing.
C. Earth is rotating about the Sun.
D. Earth is rotating about its own axis.

D.3

556

Consider a situation in which scientists wish to place a satellite in orbit around Earth.
In which direction would they launch the rocket carrying the satellite in order to gain maximum benefit from Earth's rotational velocity?

A. North.
B. South.
C. East.
D. West.

C.2

557

The group of stars forming the Southern Cross is an example of a

A. galaxy.
B. constellation.
C. solar system.
D. nebula.

B.3

558

The next four questions refer to this newspaper report. Read the article carefully and then answer the questions below.

RUSSIAN CRAFT ON VENUS

MOSCOW, Wednesday - An unmanned Soviet spacecraft landed today on Venus after a five-month journey.

The Soviet news agency Tass said the descent vehicle of the Venus 9 craft made a soft landing on Earth's nearest planetary neighbour obtaining "a unique image of the surface".

The mother spaceship remained in orbit around the planet.

The landing vehicle took the first pictures from the surface of the planet. They were relayed back to Earth by the mother craft.

Moscow Radio said that transmissions lasted for 53 minutes, which could mean that the equipment may then have failed.

The descent craft did, however, analyse the soil, which may give valuable clues on the evolution of Venus.

(AAP-Reuter).

Sydney Morning Herald 23/10/75

The reason why the mother ship stayed in orbit around Venus was to

A. track the progress of the descent vehicle.
B. power the cameras of the descent vehicle.
C. transmit information back to Earth.
D. control the movement of the descent vehicle.

C.3 559

The fact that the transmission lasted only 53 minutes suggests that the

A. craft was damaged on landing.
B. equipment collecting information failed.
C. batteries powering cameras were flat.
D. vehicle ran out of fuel.

B.3 560

Some reasons for sending a space craft to Venus may be

X - it is our closest planet.
Y - scientists want close up pictures of its surface.
Z - scientists are interested in how Venus formed.

Of these reasons the article mentions -

A. X and Y.
B. Y and Z.
C. X and Z.
D. Z, X and Y.

D.2 561

Even though Venus is our closest neighbouring planet the spaceship still took 5 months to get there. One reason to explain the long time for the journey would be

A. close objects in space are many millions of kilometres apart.
B. Venus was on the opposite side of the Sun to the Earth.
C. scientists have not yet found the shortest route to Venus.
D. the spaceship had to travel slowly to conserve fuel.

A.4 562

In recent years astronomers have used rockets to send telescopes into orbit around the Earth to obtain better pictures of the stars. Out in space these telescopes produce better pictures because they

A. are operated by computer.
B. are much nearer the stars.
C. can work during day as well as night.
D. avoid the effects of the atmosphere.

D.3 563

The Coal Sack Nebula in the Milky Way near the Southern Cross is most probably

A. a cloud of interstellar matter blotting out the light of more distant stars.
B. an area of sky where no stars exist because matter is not spread evenly through the Universe.
C. made up of particles of carbon.
D. a gap in the celestial sphere.

A.2 564

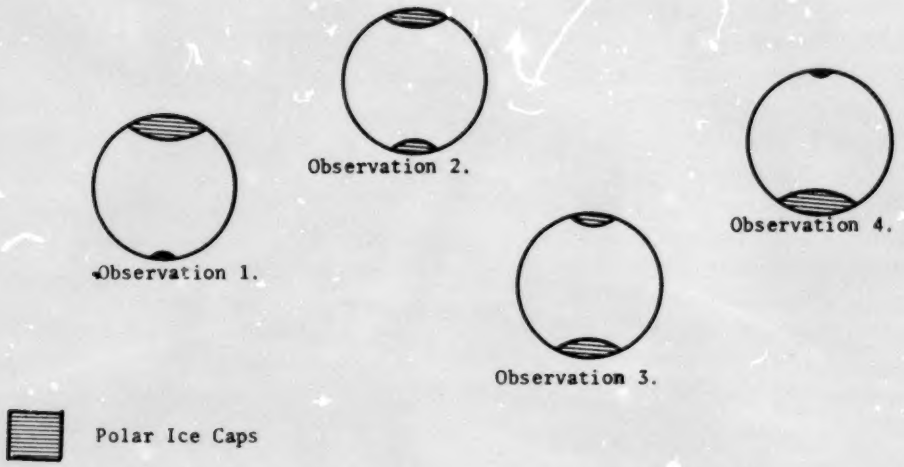
If we observe the night sky, it will be noticed that stars that rise in the east set in the west.

This occurs because of

A. Earth's revolution around the sun.
B. the stars' constant drift from east to west.
C. movement of our solar system drifting to the east.
D. Earth's rotation around its axis.

D.3 565

The following telescopic observations of the polar ice caps of Mars were made on successive occasions.



From the information obtained from the observations and knowing that the tilt of the axis of Mars is similar to that of Earth, an Earth scientist could possibly conclude that the increase and reduction of the ice caps are a result of

A. heating of the planet.
B. cooling of the planet.
C. increase in the size of the oceans.
D. seasonal changes.

566

D.4

This question refers to this table:

Planet	Approximate distance from Sun in millions of kilometres	Approximate diameter in kilometres
Mercury	58	4960
Venus	108	12320
Earth	150	12683
Mars	227	6720
Jupiter	775	125920
Saturn	1430	120160
Uranus	2860	46880
Neptune	4500	44320
Pluto	5900	estimated 6400

If the diameter of a planet was the only factor influencing the gravity of that planet, which planet(s), listed above would have a gravity closest to that of Earth?

A. Mercury. B. Venus. C. Mars and Pluto. D. Neptune.

B.4

567

The next question refers to this table.

Planet	Year length in Earth units	Mass compared with the Earth	Number of moons
Mercury	88 days	0.05	0
Venus	250 days	0.8	0
Earth	365 days	1.0	1
Mars	687 days	0.1	2
Jupiter	12 years	320	12
Saturn	30 years	95	9
Uranus	84 years	15	5
Neptune	165 years	17	2
Pluto	250 years	0.8	0

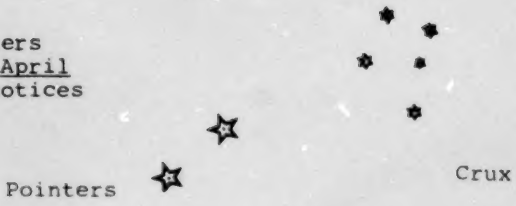
The table above shows that the inner planets move much faster in their orbits of the Sun than the outer planets. This is because they

A. have a much higher temperature than the outer planets.
B. have to defeat a greater "tug" of solar gravity.
C. are much smaller than the outer planets.
D. have no natural satellites (or moons).

B3.

568

A Keen student observes the Southern Cross and the Pointers high in the Southern sky in April at 8.00p.m. The pattern he notices is shown.



Then, in the Southern sky in October at 8.00p.m. he observes that the pattern has changed to the following.

These new positions for the Pointers and the Southern Cross are the result of

A. faulty observation by the student.
B. movement of the stars in the universe.
C. revolution of the earth around the sun.
C3 D. rotation of the earth on its axis.

569

Before the development of the telescope and modern instruments the stars of the "Milky Way" were regarded as fixed. The main reason for this belief was that

A. these stars are in fixed positions.
B. the movement of these stars is very slow.
C. the stars are so far away that their movements could not be detected.
C1 D. the "Milky Way" is the most distant galaxy from the earth.

570

The "Milky Way" appears larger than other galaxies because

A. it is, in fact, many times larger.
B. it contains more stars.
C. we are viewing it from the inside.
C1 D. it contains brighter stars.

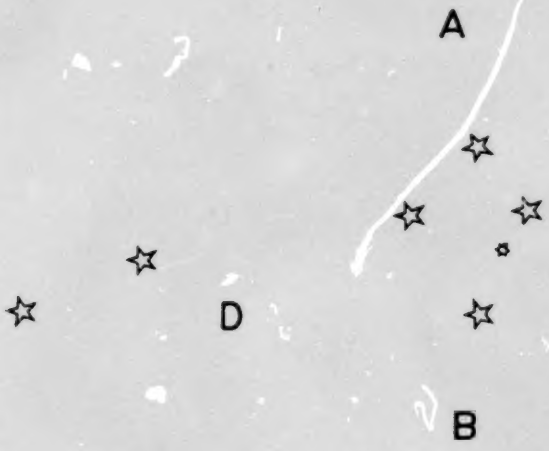
571

A galaxy could best be described as

A. a huge number of stars.
B. groups of stars forming a pattern.
C. solar systems and planets.
A1 D. the Milky Way.

572

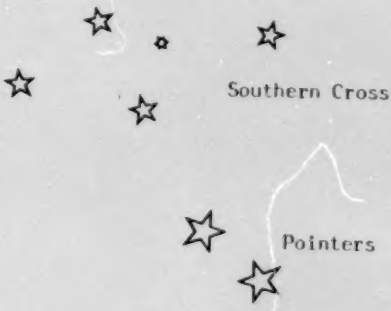
The following diagram is of the Southern Cross and pointer stars as seen in the southern hemisphere.



B1 In which of the directions A, B, C or D would an observer move if he wanted to travel south?

573

An amateur astronomer observes the south-eastern sky at 8.00p.m. in March and picks out the Southern Cross and the Pointers as are shown below.



At 12.00p.m. the Pointers will be

A. in the same position.
B. in a position exactly above the Southern Cross.
C. rotated about 60^0C from their earlier position.

C3 D. below the horizon and out of view.

574

The Coal Sack nebula in the Milky Way near the Southern Cross is most probably

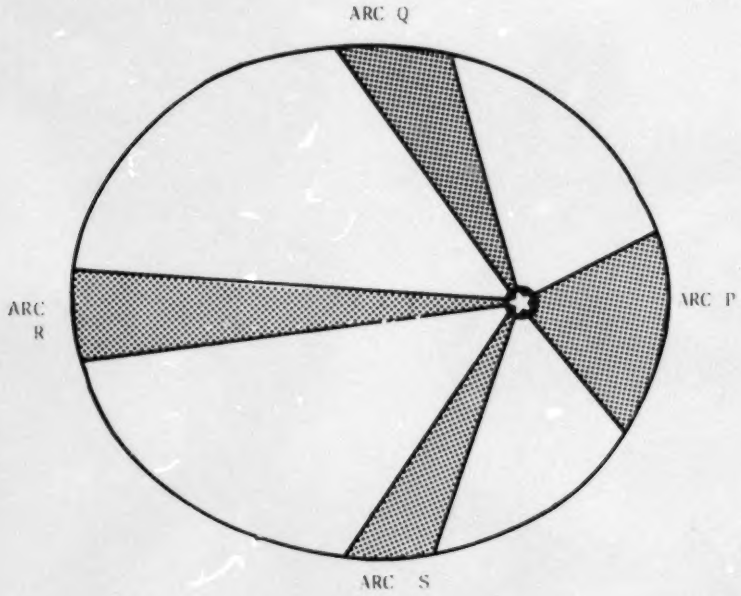
A. a cloud of interstellar matter which blots out light from more distant stars.
B. made up of particles of carbon.
C. an area of sky where no stars exist.

C1 D. a gap in the celestial sphere.

575

The next two questions refer to the following information.

Kepler's Second Law states that a line joining the Sun to a planetary body sweeps out equal areas in equal times.



All the shaded areas are equal in area.

In which part of the orbit will the above planet spend the greatest time?

A. Arc P only.
B. Arcs Q and S.
C. Arc R only.
D3 D. It will spend the same time in each.

576

In which part of the orbit will the planet have the greatest speed?

A. Arc P.
B. Arc Q.
C. Arc R.
A2 D. Arc S.

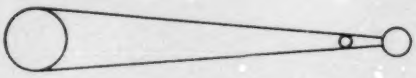
577

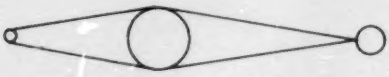
As all the major planets of the solar system are moving around the sun, they must at some stage come close to the earth. The planet which comes closest to the earth is

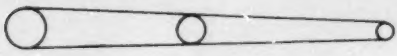
A. Mars.
B. Mercury.
C. Moon.
D1 D. Venus.

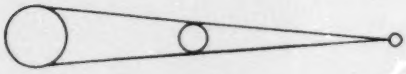
578

Which of the following diagrams represents an eclipse of the sun?

A. 

B. 

C. 

D. 

A3

579

"Comets have been described as 'the nearest thing to nothing that anything can be and still be something'."
The reason for this statement is that comets

A. are very small objects in the sky.
B. are not important in astronomy.
C. cannot be seen easily.
D1 D. have a very low density.

580

An astronaut secretly packs a set of bathroom scales for his trip to the Moon. When he arrives on the Moon and weighs himself, he will find that the scales show he has

A. no weight.
B. less weight than on Earth.
C. the same weight as on Earth.
B3 D. more weight than on Earth.

581

Of the following, the event which has nothing to do with gravity is the

A. path of meteors through the atmosphere.
B. path of comets around the sun.
C. rotation of the Earth on its axis.
C1 D. rotation of the Earth around the sun.

582

A natural satellite of the earth is the

A. atmosphere.
B. moon.
C. south celestial pole.
D. sun.

84

583

The twinkling of a star is caused by

A. small particles of dust in the atmosphere.
B. the star becoming brighter and then darker suddenly.
C. refraction of light by different layers of hot and cold air in the atmosphere.
C3 D. interstellar matter in the universe between the visible stars. 584

It is possible to determine which elements are present in stars. This is achieved by a study of

A. brightness of stars. C. star colours.
B1 B. spectra of star light. D. star sizes. 585

The correct name for a shooting star or falling star is

A. an asteroid. C. a meteor.
D1 B. a comet. D. a meteorite. 586

A light year is

A. the distance light travels in a year.
B. the time taken for light to travel across the galaxy.
C. only 365 days compared to a leap year of 366 days.
A4 D. the distance between two stars. 587

A light year is often used in astronomy because

A. all information from the universe comes to us at the speed of light.
B. the distances involved are very large.
C. astronomy is based completely on observation of light.
B3 D. the speed of light is infinite and so is the universe. 588

Small groups of stars form patterns in the night sky. These patterns are called

A. the celestial sphere. C. the ecliptic.
D4 B. nebulae. D. constellations. 589

A boy observes the south-eastern sky at 8.00p.m. and identifies the Southern Cross and the Pointers. Later, at midnight in the same night he observes that the pointer appears to have moved. This has resulted from

A. an incorrect earlier observation.
B. the revolution of the earth around the sun.
C. the spin of the earth on its axis.
C3 D. movement of the stars around the earth. 590

Our sun is an average star. Some stars are hotter, some colder. Some are larger, some smaller. To account for the differences observed in stars, modern theories suggest that

A. stars are composed of completely different elements.
B. small cool stars eventually explode forming larger hot stars.
C. stars evolve, undergoing changes as they grow older.
D. the further a star is from earth, the smaller and cooler it is.

C2 591

The scientist who invented the reflecting (mirror type) telescope was

A. Galileo Galilei. C. Sir William Herschel.
B. Edmund Halley. D. Sir Isaac Newton.

B1 592

The scientist who invented the refracting (lens type) telescope was

A. Tycho Brahe. C. Edmund Halley.
B. Galileo Galilei. D. Sir Isaac Newton.

A1 593

The distance that man can investigate space from earth is determined by the area of the collector of the telescope. The instrument which would investigate furthest into space would therefore be

A. a glass refractor telescope.
B. a pair of binoculars.
C. the Mt. Palomar 500 cm reflector telescope.
D. the Parkes radio telescope.

D2 594

In recent years astronomers have used rockets to send telescopes into orbit around the earth to obtain better pictures of the stars. These telescopes obtain better pictures because they are

A. operated by computer.
B. much nearer the stars.
C. able to work during the day as well as at night.
D. avoiding the effects of the earth's atmosphere..

D1 595

Which of the following instruments has enabled man to investigate the greatest distance into the universe?

A. Optical refracting telescope.
B. Optical reflecting telescope.
C. Radio telescope.
D. Satellite tracking telescope.

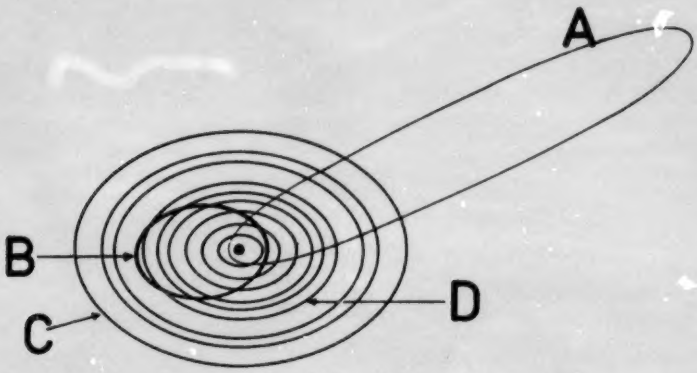
C2 596

Stellar energy (energy produced by stars) is mostly the result of

A. combustion of hydrogen gas.
B. gravitational energy.
C. nuclear energy.
D. photochemical ion energy.

C1 597

The next question refers to the following diagram.



A3 The diagram above represents the Solar System. Which labelled path represents the orbit of a comet? 598

The next question refers to the diagram below.

This diagram illustrates the ancient belief that

A. common people did not understand the universe.
B. the moon revolved around the sun.
C. the earth was the centre of the universe.

B3 D. the stars were only visible in the evening or night. 599

The Sun is a star like those you see in the sky on a dark night. Our Sun looks much larger than other stars because

A. it is brighter.
B. it is closer than other stars.
C. it is yellow whereas other stars are white.

B3 D. the other stars are situated in other galaxies. 600

Mars has a tilted axis and therefore has

A. an unstable crust.
B. seasons.
C. constant movement of water across its surface.
D. the conditions necessary for life.

B3 601

Asteroids are generally situated between the orbit of Mars and Jupiter, about 2 astronomical units from the Earth. In 1983, the asteroid 1976UA will approach to within 0.12 astronomical units of earth. This close encounter is the result of

A. eccentric orbits of planets and asteroids.
B. the wobble of the earth's axis of rotation.
C. the earth's drift from the sun as shown by the coming ice age in the Northern Hemisphere.
D. the asteroids being attracted to the earth.

A1 602

It is commonly known that Saturn has a series of rings around it. However, recent space probes have shown similar rings around

A. Jupiter.
B. Mars.
C. Mercury.
D. Pluto.

A3 603

The sixth planet from the sun is

A. Neptune.
B. Saturn.
C. Uranus.
D. Venus.

B4 604

In the night sky, "wandering stars" can be observed to move among "fixed stars" throughout the year. These "wandering stars" are really

A. comets.
B. meteors.
C. planets.
D. supernovae.

C2 605

Comets travel through space in a very eccentric orbit

A. between the earth and the sun.
B. between the stars in the Milky Way.
C. around the Earth.
D. around the sun.

D2 606

Halley's Comet appeared last in 1910 and is expected to return every 77 years. This regular return indicates that Halley's Comet

A. has a planetary like motion.
B. is attracted to the earth.
C. is repelled by the sun.
D. revolves around the centre of the galaxy.

A2 607

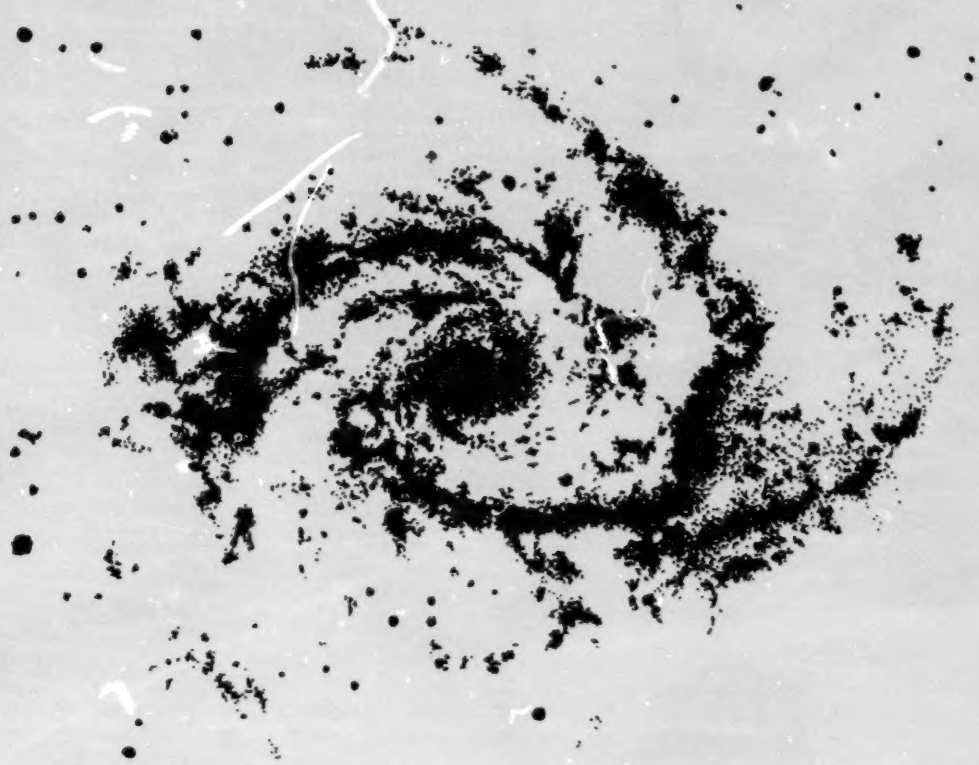
The nearest galaxy to our own galaxy is

B1
A. the Milky Way.
B. Andromeda.
C. Orion.
D. The Southern Cross.

608

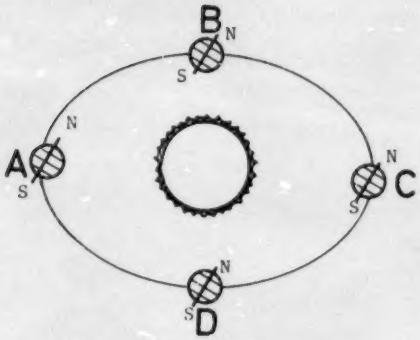
The photograph below is most likely

C4
A. a black hole.
B. an exploding star.
C. a galaxy.
D. the solar system.



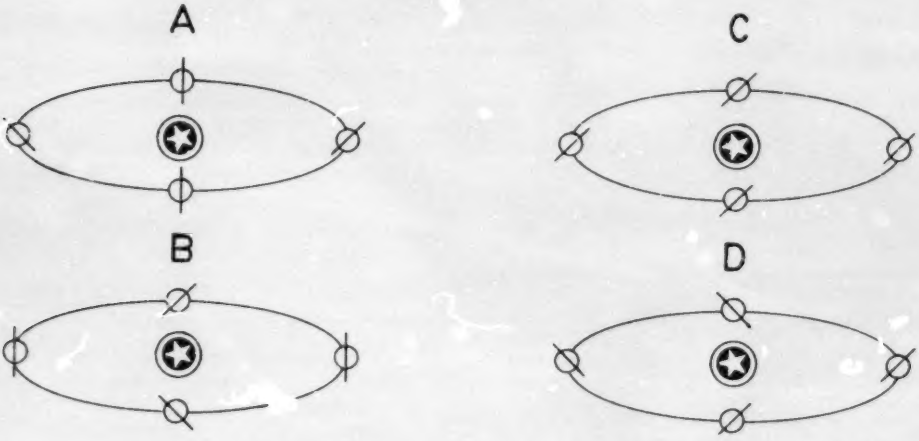
609

The next question refers to the following diagram.



C1 In which of the above positions is the Southern Hemisphere experiencing a summer? 610

Which of the following diagrams shows how the earth's axis of rotation varies as it moves around the sun?



C3 611

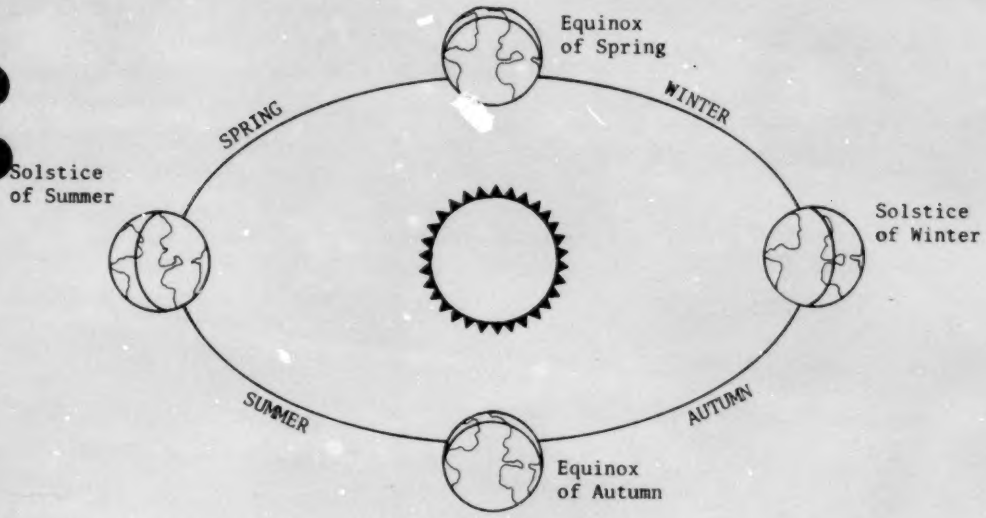
The next question refers to the following diagram.

When the sun, earth and moon are all in a perfectly straight line, with the earth in the middle as shown, the event is called

D2
A. a full moon.
B. a new moon.
C. an eclipse of the sun.
D. an eclipse of the moon.

612

The next question refers to this diagram.



This illustration shows the earth at four characteristic positions on its orbit as it makes its way round the sun. As the earth travels round the sun, it keeps its axis of rotation always in the same direction. For this reason we have the seasons.

We undergo day and night because

A. the sun moves from east to west.
B. the stars move from west to east.
C. the earth rotates from west to east.
C4 D. plants need light for photosynthesis. 613

If we observe the night sky, it will be noticed that stars that rise in the east set in the west.
This occurs because of

A. the earth's revolution around the sun.
B. the star's constant drift from east to west.
C. movement of our solar system drifting to the east.
D4 D. earth's rotation around its axis. 614

The axis of rotation of the earth stays at an angle of $23\frac{1}{2}^0$.
This may be explained in the same way as

A. planets moving in nearly circular paths around the sun.
B. a moving bicycle is more easily balanced than a stationary one.
C. a rolling car continuing to move until slowed by friction.
B1 D. water being flung outwards from clothes in a spin dryer. 615

D. West, Government Printer, New South Wales – 1981